

**UTAH DIVISION OF RADIATION CONTROL
ENERGYSOLUTIONS LLRW DISPOSAL FACILITY
CLASS A COMBINED AMENDMENT REQUEST**

SAFETY EVALUATION REPORT

August 25, 2006

**for
Utah Division of Radiation Control
168 North 1950 West
Salt Lake City, UT 84114-4850**

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ACRONYMS AND INITIALISMS

11e.(2)	Section 11e.(2) of the Atomic Energy Act of 1954, as amended
1998 LRA	License Renewal Application dated March 16, 1998
2003 LRA	License Renewal Application dated July 2, 2003
2005 LRA	License Renewal Application dated June 20, 2005
ABC ALA	Application for License Amendment (Classes A, B & C waste) dated December 13, 2000.
Act	Utah Radiation Control Act
AMEC	AMEC Earth and Environmental, formerly AGRA Earth and Environmental
AR	amendment request
ASCE	American Society of Civil Engineers
ASTM	ASTM International, formerly American Society for Testing and Materials
CAC cell AR	Class A Combined Amendment Request
CAN AR	Class A North Amendment Request
CEDE	committed effective dose equivalent
CFR	Code of Federal Regulations
cm/sec	centimeters per second
CQA/QC	Construction Quality Assurance/Quality Control
CSLM	Controlled Low Strength Material
CWF	Containerized Waste Facility
DDE	deep dose equivalent
DOE	US Department of Energy
DOT	US Department of Transportation
Division	Utah Division of Radiation Control
EIS	environmental impact statement
EJR	engineering justification report
EnergySolutions	Formerly Envirocare of Utah, LLC; formerly Envirocare of Utah, Inc.

*EnergySolutions CAC Amendment Request
Preliminary Draft Safety Evaluation Report
August 2006*

EPA	US Environmental Protection Agency
EWIS	Electronic Waste Information System
Fernald	DOE Fernald Closure Project
FR	Federal Register
ft	feet; foot
ft/ft	feet per foot
g	gravity
H	horizontal
HIC	High Integrity Container
hr	hour; hours
in	inch; inches
in/yr	inches per year
LARW	Low-Activity Radioactive Waste
LLRW	Low-level Radioactive Waste
LRA	License Renewal Application
mR/hr	milliroentgen/hour
mrem	millirem
mrem/yr	millirem/yr
NORM	naturally occurring and accelerator produced material
NRC	US Nuclear Regulatory Commission
PATHRAE	Low-Level Radioactive Waste Environmental Transport and Risk Assessment Code
PE	professional engineer
PMF	Probable Maximum Flood
PMP	Probable Maximum Precipitation
QAM	Quality Assurance Manual
QAP	Quality Assurance Program
R	Roentgen

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RCRA	Resource Conservation and Recovery Act
SER	safety evaluation report
SLB&M	Salt Lake Baseline and Meridian
SNM	Special Nuclear Material
SSC	superconducting supercollider
TEDE	total effective dose equivalent
TSD	Treatment, Storage and Disposal
UDOGM	Utah Division of Oil, Gas and Mining
UDSHW	Utah Division of Solid and Hazardous Waste
UDWQ	Utah Division of Water Quality
UMTRA	Uranium Mill Tailing Remedial Action
UNSAT-H	Unsaturated Soil Water and Heat Flow
URCB	Utah Radiation Control Act
URCB	Utah Radiation Control Board
URCR	Utah Radiation Control Rules
URS	URS Corporation
USACE	US Army Corps of Engineers
V	vertical
yr	year

1.0 INTRODUCTION

EnergySolutions is presently licensed to dispose of low-level radioactive waste (LLRW) in three embankments: the low-activity radioactive waste (LARW) embankment, Class A embankment, and the Class A North embankment. EnergySolutions also disposes of mixed low-level radioactive waste in a fourth embankment authorized under its radioactive materials license and a hazardous waste disposal permit. EnergySolutions has requested a license amendment to allow disposal of LLRW in a Class A Combined (CAC) cell. The CAC cell would extend the limits within which LLRW could be disposed of within the footprint of the currently authorized Class and Class A North embankments and including the area that lies between them. Most CAC cell design features are identical to those already approved for use in the Class A and Class A North embankments. This Safety Evaluation Report identifies issues the Utah Division of Radiation Control (the Division) has addressed in its review of the CAC cell amendment request and justifies its decision to grant the request.

The Division is responsible to regulate activities in the State of Utah that involve radioactive materials, some types of radioactive waste, and radiation. As part of this responsibility, the Division enforces requirements promulgated by the State of Utah. The regulations that deal with disposal of radioactive waste are contained in the Utah Radiation Control Rules (URCR), Sections R313-25, "License Requirements for Land Disposal of Radioactive Waste, General Provisions." More generally applicable regulations are contained in URCR Sections R313-15, "Standards for Protection Against Radiation" (that defines the requirements for protecting individuals from the effects of radiation) and R313-22, "Specific Licenses" (that identifies general licensing conditions, many of which are satisfied by or superseded by the provisions of URCR R313-25). Other sections of URCR are also indirectly applicable.

Pursuant to regulation implementation, the Division has issued licenses to various entities within the State of Utah to possess and manage radioactive materials and wastes. One such entity, EnergySolutions, LLC (previously Envirocare of Utah, LLC), is licensed to receive, store, and dispose by land burial several categories of radioactive materials and waste:

- Naturally-occurring radioactive material (NORM) waste
- Low-activity radioactive waste (LARW)
- Class A low-level radioactive waste (LLRW)
- Special Nuclear Material (SNM)
- Radioactive waste that is also determined to be hazardous (mixed waste)

EnergySolutions holds the following licenses and permits:

- State of Utah Radioactive Material License UT2300249, Amendment 22C. [Under timely renewal (Utah Radiation Control Board to Envirocare of Utah, Inc. 2003.)]
- State of Utah Radioactive Material License, 11(e).2 Byproduct Material License UT 2300478, Amendment 2. [Under timely renewal (Utah Radiation Control Board to Envirocare of Utah, Inc. 2005.)]
- State-issued Part B Permit, EPA Identification Number UDT982598898. (Utah Solid and Hazardous Waste Control Board to Envirocare of Utah, Inc. 2003.)
- State of Utah Ground Water Quality Discharge Permit Number UGW450005. [Under timely renewal (Utah Water Control Board to Envirocare of Utah, Inc. 2004.)]
- State-issued Air Approval Order DAQE-AN0717013-06, most recently amended on July 13, 2006.

In order for the Division to ensure that all applicable regulatory requirements will be satisfied by proposed changes to licensed facilities and operations, the Licensee must submit license amendment requests detailing and justifying the proposed action according to provisions of URCR R313-22-38. As is required by Division rules, EnergySolutions (also referred to herein as “Licensee”) has submitted to the Division and revised an Amendment Request (AR) to construct and operate a CAC cell in the areas of the existing Class A embankment, existing Class A North embankment and the corridor between them.

The purpose of this Safety Evaluation Report (SER) is to identify and summarize the information the Division evaluated in its review of the Licensee’s amendment request and the grounds upon which the Division staff concludes whether regulatory requirements are satisfied.

1.1 NATURE OF SAFETY EVALUATION REPORTS

Under authority of the Utah Radiation Control Act (Act), the Radiation Control Board has established the requirements and criteria for licensing commercial LLRW disposal facilities contained in URCR R313-25 entitled “License Requirements for Land Disposal of Radioactive Waste - General Provisions.” Under provisions of URCR R313-25-4, no person may receive, possess, or dispose of waste at a land disposal facility unless authorized by a license issued by the Executive Secretary pursuant to R313-25 and R313-22.

The requirements of URCR R313-25 address such topics as:

- Performance Objectives
- Site Suitability Requirements
- Facility Design, Construction, Operating, Closure, and Post-closure Requirements
- Waste Characteristic Requirements
- Environmental Monitoring Requirements

- Financial Assurance and Financial Qualifications Requirements
- Administrative Requirements
- The Division reviews Licensee's license amendment requests to determine the extent to which each applicable regulatory requirement is satisfied and ensure that particular licensing actions are justifiable under provisions of the regulations. The license amendment process for major modifications follow the following steps:
- Review the license amendment request.
- Prepare interrogatories as necessary to resolve issues not adequately addressed in the amendment request.
- Review interrogatory responses, assuring that all required information is contained in either the initial submittal or responses to interrogatories.
- Prepare draft Safety Evaluation Report and draft license revisions.
- Publicize the Executive Secretary's decision to amend the license.
- Conduct public hearings and receive public comment.
- Prepare final Safety Evaluation Report and final license and groundwater permit revisions
- Prepare public participation document

The Licensee's operations are also subject to the provisions of Ground Water Quality Discharge Permit Number UGW450005 (herein referred to as "the Permit"), issued by the Utah Division of Water Quality (UDWQ). This permit specifies that groundwater quality protection levels must be met for no fewer than 500 years following facility closure for radioactive constituents and 200 years for named non-radioactive constituents. Revisions to EnergySolutions' Groundwater Quality Discharge Permit (GWQDP) are also addressed in the document.

2.0 HISTORICAL OVERVIEW

The first activities involving radioactive waste management at South Clive, Utah were those conducted by the US Department of Energy (DOE). DOE Removed uranium mill tailings from the inactive Vitro mill site located near Salt Lake City, Utah beginning in February 1985 and concluding in June 1989. The tailings were transferred to a specially constructed embankment in Section 32, Township 1 South and Range 11 West, Tooele County, Utah. Radioactive and radioactively contaminated materials that remained at the inactive Vitro site were excavated and relocated by rail and truck to the site, located 85 miles west of Salt Lake City in South Clive.

Concurrent with the Vitro relocation project, a predecessor to the Licensee began disposal operations at its Clive facility in 1988 under a State license to dispose of NORM waste. In 1990, the Licensee submitted a license application to modify its license to allow disposal of LARW. In 1991, the Division granted this amendment request by issuing a license for LARW disposal. From time to time, the LARW disposal license has been amended to address the Licensee's changing needs and those of the public interest. In 1998, the Division renewed the Licensee's license to dispose of LARW.

The licensure history of the radioactive waste disposal facilities located at South Clive, Utah is as shown in Table 1.

Table 1. Licensure History

Owner	Dates of Licensure
Envirocare of Utah, Inc.	February 2, 1988 through May 15, 2005
Envirocare of Utah, LLC	May 16, 2005 through March 1, 2006
EnergySolutions, LLC	Commencing March 2, 2006.

2.1 CHRONOLOGY OF ENERGYSOLUTIONS' LICENSE ACTIVITIES

Currently, the Licensee disposes of NORM, 11e.(2) waste, LARW, LLRW, and Mixed Waste at its South Clive, Utah disposal facility under licenses issued by the Division. The facility's licensing and permitting history is summarized below:

- 1984-1988 – DOE disposal of Vitro Tailings: Remedial activities began at the Salt Lake City Vitro mill site in February 1985 and were completed in June 1989. Contaminated materials that remained at the site were excavated and relocated by rail and truck to a South Clive disposal cell; a new site acquired by the State of Utah and located 85 miles west of Salt Lake City.
- 1988 – Envirocare begins disposing of NORM: On February 28, 1988, Envirocare received its first license from the Utah Bureau of Radiation Control to dispose of naturally occurring radioactive material.

- 1991 – License amendment for LARW disposal: On March 21, 1991, Envirocare received a low-level radioactive license from the Bureau of Radiation Control that allowed them to accept 44 radionuclides with specified concentration limits less than the Class A LLRW limits.
- 1991 – Groundwater Quality Discharge Permit issued by the Utah Bureau of Water Pollution Control on March 21, 1991
- 1991 – Mixed Waste permit: On November 30, 1991, Envirocare received a Resource Conservation and Recovery Act (RCRA) hazardous waste permit from the Bureau of Solid and Hazardous Waste to accept Mixed Waste.
- 1992 – Resolution and Order agreement with Northwest Compact: On May 28, 1992, Envirocare entered into an arrangement, the “Resolution and Order” with the Northwest Interstate Compact that allowed them to accept certain types of low-level radioactive wastes from outside of the Compact. Low-level waste from Northwest Compact states was not granted access to Envirocare. Envirocare was also granted permission to accept Mixed Waste from all states. The Resolution and Order was the result of a discussion at a December 18, 1991 meeting of the Compact. The Resolution and Order has been subsequently modified and reviewed since the original. The Second Amended Resolution and Order of November 9, 1998 is currently in effect. It was most recently reviewed at the June 5, 2002 meeting of the Compact and no changes made.
- 1993 – Uranium Mill Tailings disposal license by the US Nuclear Regulatory Commission (NRC): On November 30, 1993, Envirocare received a license from the NRC to accept uranium mill tailings.
- 1993 – LARW License Amended: On August 27, 1993, Envirocare’s LLRW license was modified by the Division to accept 14 additional radionuclides with specified concentration limits less than the Class A limits.
- 1994 – The GWQDP was amended to include the 11.e(2) disposal embankment on April 29, 1994
- 1995 – LARW License Amended: On June 20, 1995, Envirocare’s LLRW license was modified by the Division to accept 17 additional radionuclides with specified concentration limits less than the Class A LLRW limits. It was subsequently amended on November 13, 1995; to accept 8 additional radionuclides with specified concentration limits less than the Class A LLRW limits.
- 1996 – LARW Renewal: Submitted to the Division in August 1996.
- 1996 – Macro-encapsulation approval: On October 3, 1996, Envirocare received a Hazardous and Solid Waste Amendments permit from the US Environmental Protection Agency (EPA) Region 8.
- 1998 – Amended Resolution and Order agreement with Northwest Compact.
- 1998 – LARW Renewal request approved: On October 22, 1998, Envirocare was issued a 5-year permit renewal from the Division on the LLRW license, which

includes concentration limits by radionuclides less than and up to the Class A LLRW limits.

- 1999 – Class B & C application submitted
- 2000 – The GWQDP was renewed on March 1, 2000.
- 2000 – Full Class A waste disposal license approved: On October 5, 2000, Envirocare was issued a license from the Division for a new Class A disposal cell that allowed them to take up to the Class A LLRW limits.
- 2001 – Land Ownership exemption granted: On January 19, 2001, the Utah Radiation Control Board (URCB) granted Envirocare an exemption to the state and federal land ownership rule based on several conditions being met.
- 2001 – Class B & C License granted pending approval: On July 9, 2001, Envirocare was issued a separate license to accept Class B and C LLRW to the Division pending legislature and gubernatorial approval. The license was subsequently appealed to the URCB.
- 2001 – Class A LLRW Cask Amendment Granted: On October 19, 2001, Envirocare was issued an approval for an amendment to receive and dispose of Class A LLRW in casks.
- 2003 – Final agency action of Class B & C: On February 10, 2003, Envirocare was granted final agency action by the URCB on the Class B and C LLRW license (pending legislative and gubernatorial approval).
- 2003 – Uranium Mill Tailings amendment request: On March 27, 2003, Envirocare submitted a request to the NRC to amend their current uranium mill tailings license to accept tailings with Radium-226 concentrations up to 100,000 pCi/g. This was to allow them to accept the DOE Fernald Closure Project (Fernald) waste if it were classified as 11e(2).
- 2003 – Uranium Mill Tailings disposal renewal request: On May 27, 2003, Envirocare submitted a renewal application to the NRC for the uranium mill tailings disposal cell. Envirocare was granted timely renewal (current license remaining in effect until a decision is reached on the renewal application).
- 2003 – Class A LLRW renewal request: On July 2, 2003, Envirocare submitted a renewal application to the Division for its current license. Envirocare was granted timely renewal.
- 2003 – Withdrawal of mill tailings amendment request: On November 19, 2003, Envirocare withdrew their request for a license amendment from the NRC to accept the Fernald waste.
- 2004 – Mixed Waste license public comment period: On May 4, 2004, a 30-day public comment period commenced on a license amendment for Envirocare to accept Mixed Waste up to Class A limits.

- 2005 – On May 16, 2006 Licenses and permits transferred from Envirocare of Utah, Inc. to Envirocare of Utah, LLC.
- 2005 – Class A LLRW North Embankment amendment request: On January 17, 2005, Envirocare submitted a request for a license amendment to allow disposal of Class A materials in the northern area previously approved for Class A, B, and C waste disposal. This embankment became known as the Class A North cell.
- 2005 – Withdrawal of Class B/C license request in February 2005.
- 2005 – Submission of License Renewal Application, Revision 2, on June 20, 2005.
- 2005 – Submission of the CAC cell amendment request on May 27, 2005. This amendment request was to extend the limits within which waste could be disposed to include the Class A cell, the Class A North cell, and the corridor between these two embankments.
- 2006 – Licenses and permits transferred from Envirocare of Utah, LLC to EnergySolutions LLC on March 2, 2006.

2.2 REGULATORY CONCLUSION OF ENERGYSOLUTIONS’ SAFETY AND REGULATORY COMPLIANCE

All activities at the Licensee’s South Clive site are conducted under programs designed to protect the health and safety of facility workers and of the general public and authorized by the Division. The Licensee’s operations are conducted under the ongoing regulatory scrutiny of Division inspectors who provide continuing assurance that the interests of radiological safety are properly addressed.

On April 24, 2006, the Division approved the most recent annual surety report (dated August 31, 2005). The Licensee has demonstrated that it is financially capable to carry out all licensed activities. The Licensee has provided financial assurances sufficient to fund the safe closure of the facility, as well as the long-term monitoring and maintenance of the proposed facility. It has also provided information about the required qualifications of those persons who will operate the facility and about its proposed training program.

3.0 DESCRIPTION OF CAC CELL AMENDMENT REQUEST

3.1 DESCRIPTION OF THE PROPOSED CAC CELL EMBANKMENT

The Licensee's disposal facility design for the CAC cell is conceptually the same as the Class A and Class A North designs. It is designed as a primarily above grade landfill embankment and occupies the same footprint as these two embankments and the corridor between them. Refer to Figures 1 through 3 to see the relationship between these two previously approved cells and the proposed CAC cell.

The CAC cell will be constructed using materials native to the site or found in close proximity to the site. Engineered features of the CAC cell are designed based upon State of Utah regulations, NRC guidance, Environmental Protection Agency (EPA) guidance, and the Licensee's past experience at this location.

The design features whose characteristics would be most affected by the proposed changes include:

- Waste will be placed to a height of about 77 feet above existing grade, whereas the maximum height above natural grade with the Class A and CAN embankments was about 54 and 43 feet, respectively.
- Type B Filter in the disposal unit cover system is 24 inches rather than 6 inches thick
- The salient characteristics of the surface water drainage system remain unchanged, although ditches in the corridor between the Class A and CAN cells are eliminated.

The majority of existing procedures and plans applicable to the EnergySolutions facility as a whole are unaffected by the permitting of the CAC cell geometry, including Radiation Safety, Quality Assurance, Health and Safety, Training, Electronic Recordkeeping, and Administration. Updated discussion and procedures in these areas are located in the Licensee's License Renewal Application, June 20, 2005 (Envirocare of Utah, LLC, 2005c, LRA).

No change will result to waste placement procedures, equipment used, or forms used in documenting waste placement as a result of permitting the CAC cell. Limited revisions to the Construction Quality Assurance Quality Control (CQA/QC) Manual will be made in conjunction with permitting the CAC cell. Waste placement in the CAC cell will be done in accordance with the current approved CQA/QC Manual [which is revision 19h dated April 4, 2006 and approved on April 12, 2006 (EnergySolutions 2006b)] or any subsequent revision to the CQA/QC Manual approved by the Division.

The Licensee's anticipated schedule and sequence of construction activities for the CAC cell will begin following technical review of the embankment design and revision to licensing and permitting documents, including the Radioactive Material License, Ground Water Quality Discharge Permit, Environmental Monitoring Plan, and surety funding calculations. Once these

Figure 1. Plan Showing Relationship between Class A, Class A North, and Combined Class A Cells

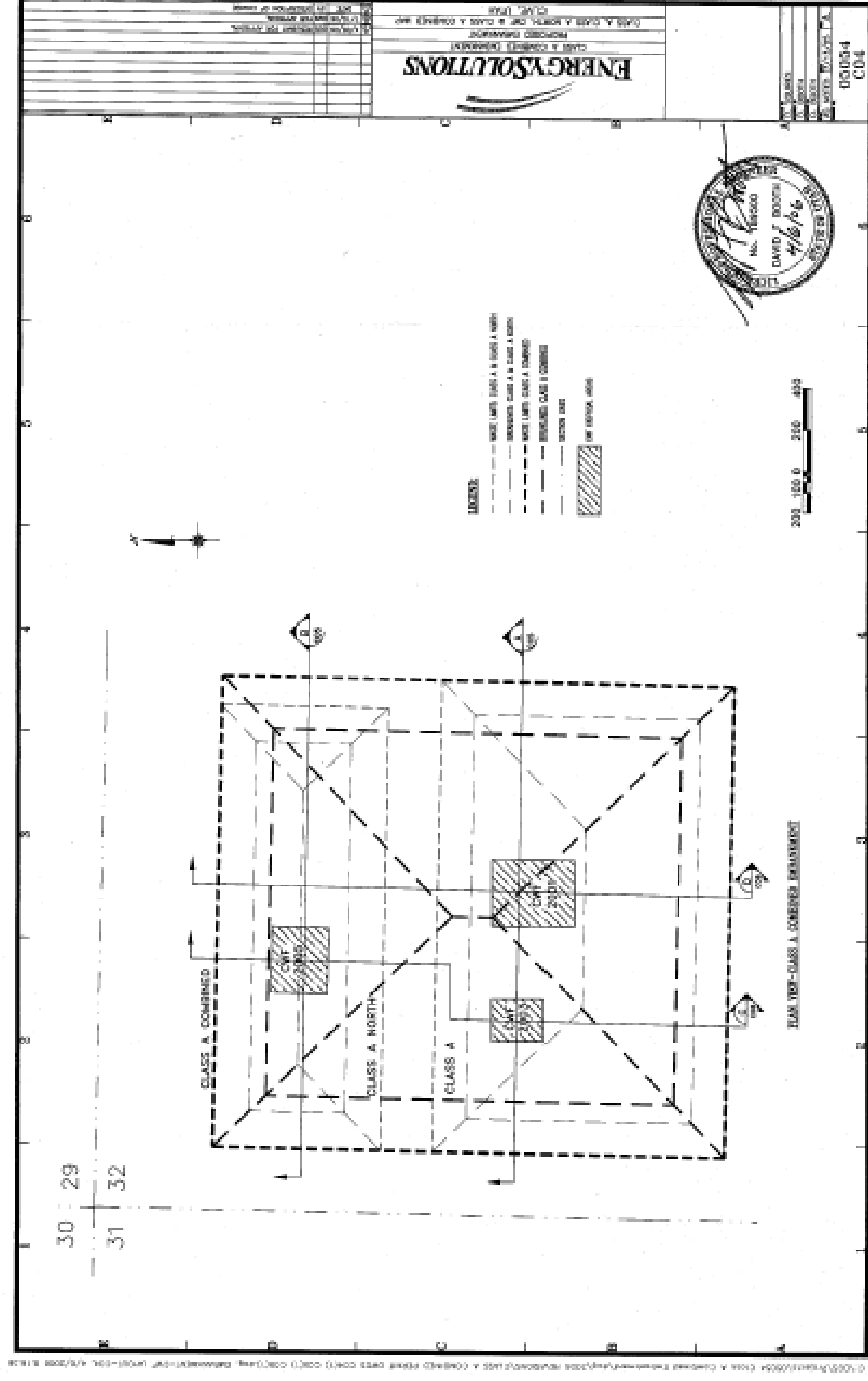


Figure 2. East-West Sections Showing Relationships between Class A, Class A North, and Combined Class A Cells

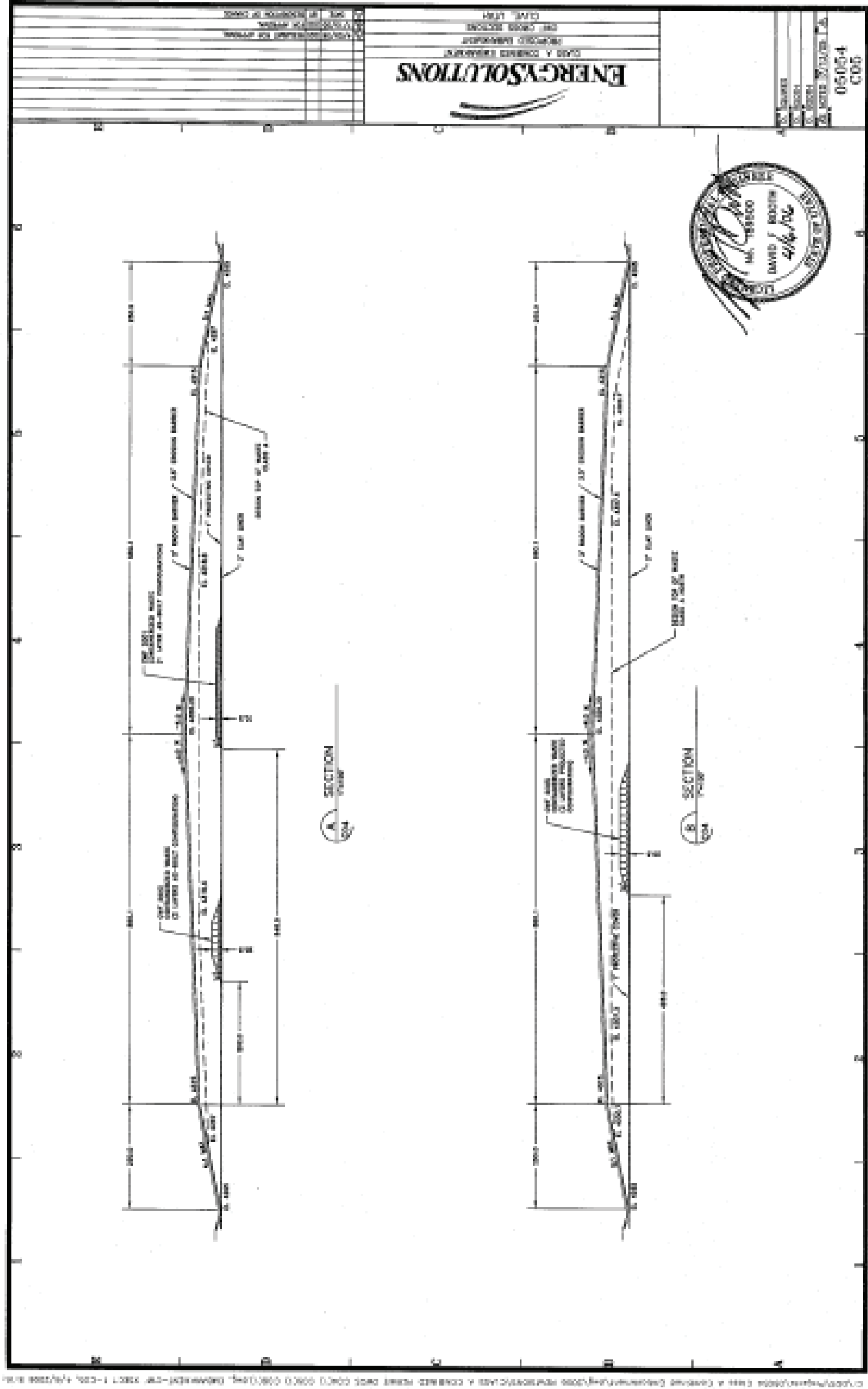
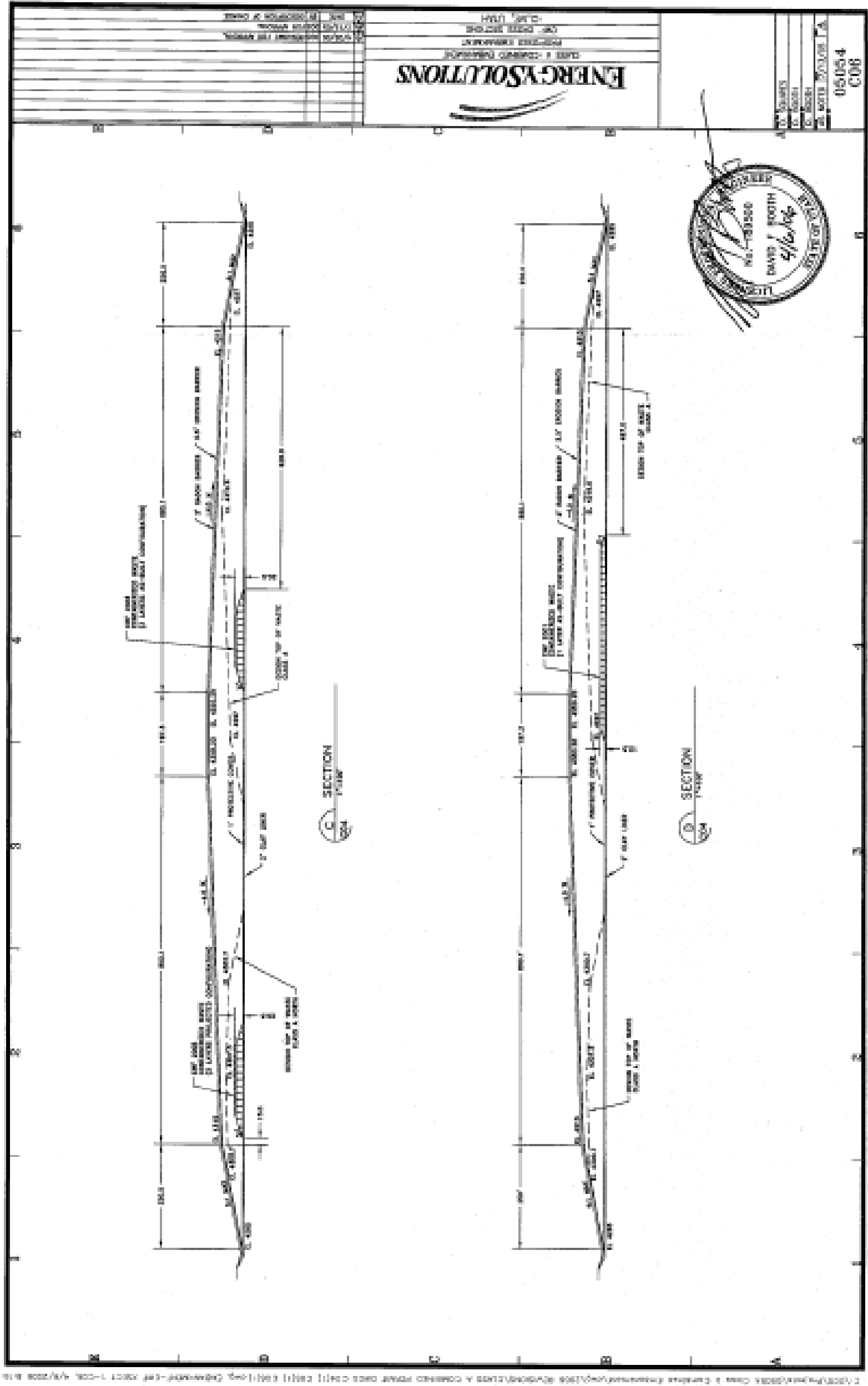


Figure 3. North-South Sections Showing Relationships between Class A, Class A North, and Combined Class A Cells



approvals are complete, the Licensee will begin waste placement to the elevations of the combined embankment. Waste placement will proceed generally from south to north in the combined embankment, starting on top of existing wastes placed in the Class A embankment footprint. It is expected that the CAC cell will add approximately ten (10) years of disposal capacity to the Licensee site.

3.2 BASES FOR CAC CELL REVIEW AND CONCLUSIONS

As described in the foregoing section, the design and operation of the proposed CAC cell is substantially similar to those already approved for use in the Class A North (CAN) and Class A disposal embankments. Where the Division judged the proposed condition to be identical to one already reviewed and approved by the Division, the Division accepted previous approval as justification for approving the CAC cell proposal.

3.3 DESCRIPTION OF REVIEW/COMMENT/RESPONSE PROCESS

In reviewing the CAC cell AR, the following major issues were identified, evaluated, and resolved:

- Characteristics and design of the embankments, including the clay liner, waste emplacement and backfill, cover system, and buffer zone.
- Physical performance of the embankment, including effects on cover design of projected differential settlement and consolidation, annual infiltration rates, and effective transit times for water and contaminants migrating within and under the waste embankment.
- Radiological performance of the disposal system, including determining the extent to which the Utah groundwater protection standards are satisfied and estimating potential radiological impacts to members of the public that might be exposed to releases from the facility during operations.

The Division and the Licensee have resolved all regulatory issues as required by Division regulations as discussed in detail in this SER. Where the Division judged information submitted by the Licensee to be inadequate to make an affirmative decision, formal interrogatories were issued to solicit lacking information. Once all required information was provided and all issues were resolved to the Division's satisfaction, preparation of this SER was finalized. The Division has received or developed information that provides reasonable assurance that all applicable performance objectives and regulatory requirements involved in these regulatory issues of this SER will be satisfied.

4.0 FACILITY SAFETY AND REGULATORY COMPLIANCE

Part R313-25 of the URCR contains regulatory requirements that apply to the amendment of a license to disposal of low-level radioactive waste. This chapter of the SER addresses the extent to which applicable requirements are met, as documented to the Division in the Licensee's license amendment application and other associated submittals.

Sections 1 through 5 of URCR R313-25 contain general information, present definitions of terms with special meanings, list requirements for siting new LLRW disposal facilities, enumerate the State's requirement that a license is required to dispose of radioactive waste, and identify in broad terms the content requirements of a license amendment application. Section 12 of URCR R313-25 addresses the concept of license conditions. Sections 14 through 17 of URCR R313-25 address licensing actions for which the Licensee is not now applying, and that, therefore, do not now apply. Section 27 of URCR R313-25 addresses alternative requirements for design and operation, which also do not apply to the Licensee's facility and operation. Finally, Sections 34 and 35 of URCR R313-25 deal with activities and authorities of the Executive Secretary and do not relate to the review of the Licensee's license amendment application. The sections in this paragraph were not considered in evaluating the extent to which the Licensee has satisfied applicable licensing requirements.

Several other regulatory provisions exist for which findings in support of this CAC cell AR are not required. Among other reasons, these requirements may apply only to the Division or may enumerate options available to the Division or the Licensee. Those requirements of URCR R313 Section 25 for which no finding is necessary are listed below:

Table 2. Requirements of URCR R313 Section 25 for which no Finding is Necessary

URCR R313 Section	Reason
25-1	Purpose and Scope
25-2	Definitions
25-3	Requirements do not apply to this expansion of an existing facility.
25-4	The general requirements that a person must have a license to dispose of LLRW, for which The Licensee is already licensed in the current LLRW cell and is the subject of this Amendment Request review.
25-5	Requirements and Information Needed for application
25-9	Institutional Control information is unchanged by the amendment request
25-11	Requirements for Issuance of license are unchanged by the amendment request
25-12	Conditions applicable to transferring, assigning, disposing of or transferring control of a license granted under URCR R313-25, none of which is a request of this amendment request.
25-13	Application for Renewal or Closure
25-14	Requirements of an Application for Site Closure and Stabilization that is not an issue in the review of this Amendment Request.
25-15	Requirements of the Licensee to conduct Post-Closure Observation and Maintenance that are not an issue in the review of this Amendment Request.
25-16	Requirements for the transfer of the License that is not an issue in the review of this Amendment Request.

URCR R313 Section	Reason
25-17	Requirements for the termination of the License that is not an issue in the review of this Amendment Request.
25-23 except 23(1), 23(5), 23(9), and (11)	The site has already been determined to satisfy applicable Site Suitability requirements. Subsections 1, 5, 9, and 11, however, require consideration because of updated information submitted by the Licensee or other developments.
25-25(12)	Amendment request deals only with Class A waste, not waste that is not generally acceptable for near-surface disposal.
25-26(1)	The site is operating and requirements for Pre-Operations Environmental Monitoring have already been satisfied.
25-27	Empowers the Executive Secretary to authorize provisions other than those contained in URCR R313-25-24 and -25-26 for the segregating and disposing of waste and for designing and operating a land disposal facility, which, to date, he has not done.
25-28	Land ownership and Institutional information requirements are unchanged by the amendment request
25-33	Specifies record keeping and reporting requirements of a person licensed for LLRW disposal under URCR R313-25. As such, this is an issue for compliance monitoring rather than a criterion for granting a license amendment. However, the information and procedures provided in the Amendment Request and other submittals demonstrate that the Licensee intends to maintain information and records that are required by this regulation and that will be necessary to develop the required reports.
25-34	Requires that the Licensee perform or allow the Executive Secretary to perform tests that the latter considers necessary. Tests may address any of wastes, facilities used for receipt, storage, treatment, handling or disposal of wastes, radiation detection and monitoring instruments, and other equipment and devices used in connection with the receipt, possession, handling, treatment, storage, or disposal of waste. As such, this is an issue for compliance monitoring rather than a criterion for initial licensing.
25-35	Requires that the Licensee allow the Executive Secretary access the disposal facility for facility and records inspections. As such, this is an issue for compliance monitoring rather than a criterion for granting a license amendment.

Regulatory requirements that the Licensee must satisfy are contained in Sections 6 through 11, 13, 18 through 26, and 28 through 33 of URCR R313-25. The extent to which these requirements are satisfied as documented in the Licensee's CAC cell AR and other associated submittals are addressed in this chapter.

Regulatory requirements applicable to the amendment of the Groundwater Quality Discharge Permit and the extent to which they are satisfied by the proposed Permit amendment are addressed in Section 5 of this Safety Evaluation Report.

Table 3. Information/SER Requirement Crosswalk

Type of Information	SER Requirement	SER SECTION
General Information	Requirements 2506-1 through 2506-4	3.1
Specific Technical Information	Requirements 2507-1 through 2507- 14	3.2
Technical Analyses	Requirements 2508-1 through 2508-4	3.3
Groundwater Permit	UAC R317-6	5.0

The bases for affirmative findings for these requirements are presented in the sections listed above.

References:

- Envirocare of Utah, LLC. 2005b.

4.1R313-25-4; LICENSE REQUIRED BEFORE COMMENCING CONSTRUCTION

4.1.1 Receipt, Possession or Disposition of Waste

Requirement 2504-1 [URCR R313-25-4(1)]

Basis: At the time of the submittal, the Licensee possessed in-force radioactive materials for licenses encompassing receipt, possession and/or disposition of waste issued by the Executive Secretary. The Licensee has met the requirements of URCR R313-25-4(1) .

References:

- Envirocare of Utah, LLC. 2005a.
- Utah Department of Environmental Quality, Division of Radiation Control. 2006a.
- Utah Department of Environmental Quality, Division of Radiation Control. 2006b.

4.1.2 Filing an Application Pursuant to URCR R313-22-32

Requirement 2504-2 [URCR R313-25-4(2)]

Basis: The Licensee submitted an application pursuant to URCR R313-25-4(2) on May 27, 2005 for a license amendment to construct the CAC cell. The Licensee has met the requirements of URCR R313-25-4(2) .

References:

- Envirocare of Utah, LLC. 2005a.

4.2R313-25-5; CONTENT OF APPLICATION

Requirement 2505 [URCR R313-25-5]

Basis: The application must meet the requirements set forth in R313-22-33, it must also include general information, specific technical information, institutional information, and financial information as set forth in R313-25-6 through R313-25-10.

The Licensee meets the general requirements set forth in R313-22-33, and the general information, specific technical information, institutional information, and financial information are evaluated in Section 4.0 and subsections of this SER

References:

- Envirocare of Utah, LLC. 2005a.

4.3R313-25-6; GENERAL INFORMATION

4.3.1 Identity of Licensee

Requirement 2506-1 [URCR R313-25-6(1)]

Basis: At the time of the submittal, the information contained in Section 1.1 of the CAC cell AR and other relevant documents (engineering reports, supplemental data submissions and interrogatory responses) the Licensee has submitted indicate that the requirements of URCR R313-25-6(1) have been met. The 2005 CAC cell AR identifies as the full name, address, and telephone number of the Licensee.

Table 4. Identification of Licensee

Identification of Licensee
EnergySolutions, LLC 423 W 300 S Ste 200 Salt Lake City UT 84101-1102 (801) 532-1330

Also included in the referenced documentation are the names and addresses of the Licensee's directors and principal officers. The License Amendment Application also specifies that Licensee's state principal business is the operation of the radioactive waste disposal operations located at Clive, Utah. Neither Envirocare of Utah, LLC, nor EnergySolutions, LLC acted as an agent or representative of another person in submitting the amendment request. Additionally, EnergySolutions is not a partnership. On February 2, 2006, Envirocare of Utah, LLC, a limited liability company organized under the laws of the State of Utah, changed its name to EnergySolutions, LLC. Directors and principal officers of EnergySolutions, LLC are as follows:

Table 5. Directors and Principal Officers of EnergySolutions

Manager and Chief Executive Officer EnergySolutions, LLC	R. Steve Creamer EnergySolutions, LLC 423 W 300 S Ste 200 Salt Lake City UT 84101-1102	
Board Members/Managers:	Jordan Clements Peterson Partners, LLC 299 S MAIN ST STE 2250 SALT LAKE CITY UT 84111-2293	Robert Lindsay Lindsay Goldberg & Bessemer 630 5TH AVE 30TH FLOOR NEW YORK NY 10111-0100
	Alan Goldberg Lindsay Goldberg & Bessemer 630 5TH AVE 30TH FLOOR NEW YORK NY 10111-0100	Andrew Weinberg Lindsay Goldberg & Bessemer 630 5TH AVE 30TH FLOOR NEW YORK NY 10111-0100

	Lance Hirt Lindsay Goldberg & Bessemer 630 5TH AVE 30TH FLOOR NEW YORK NY 10111-0100	R. Steve Creamer EnergySolutions, LLC 423 W 300 S Ste 200 Salt Lake City UT 84101-1102
Principal Officers:	Jean I. "Chip" Everest Executive Vice President, Chief Financial Officer, and Secretary EnergySolutions, LLC 423 W 300 S Ste 200 Salt Lake City UT 84101-1102	
	Al Rafati Executive Vice President EnergySolutions, LLC 423 W 300 S Ste 200 Salt Lake City UT 84101-1102	Tim Barney Senior Vice President EnergySolutions, LLC 423 W 300 S Ste 200 Salt Lake City UT 84101-1102
	Craig Thorley Senior Vice President EnergySolutions, LLC 423 W 300 S Ste 200 Salt Lake City UT 84101-1102	Tye Rogers Vice President EnergySolutions, LLC 423 W 300 S Ste 200 Salt Lake City UT 84101-1102
	Val J. Christensen Executive Vice President and General Counsel EnergySolutions, LLC 423 W 300 S Ste 200 Salt Lake City UT 84101-1102	

References:

- EnergySolutions, LLC to URS Corporation. 2006.
- Envirocare of Utah, LLC. 2005a.

4.3.2 Qualifications of Licensee

Requirement 2506-2 [URCR R313-25-6(2)]

Basis: The information contained in the CAC cell AR, along with supporting and relevant documents (engineering reports, supplemental data submissions and interrogatory responses) the Licensee has submitted indicate that the requirements of URCR R313-25-6(2) have been met.

The qualifications of the Licensee for the CAC cell AR are similar to those approved in the 2005 CAN SER, reviewed in 2005 LRA SER and in the 1998 LRA SER.

Based on the information summarized above, the Division concludes that the Licensee's qualifications are acceptable.

References:

- Envirocare of Utah, LLC. 2005a.
- URS Corporation. 1998.
- URS Corporation. 2005a.
- URS Corporation. 2005b.

4.3.3 Proposed Disposal Site and Activities

Requirement 2506-3 [URCR R313-25-6(3)]

Basis: The information contained in the CAC cell AR and other relevant documents (engineering reports, supplemental data submissions and interrogatory responses) the Licensee has submitted indicate that the requirements of URCR R313-25-6(3) have been met. The CAC cell AR provides an adequate description of the proposed Class A Combined Embankment. The CAC cell AR and other documents describe the legal location of the operating Clive radioactive waste disposal facility as Section 32, Township 1 South, Range 11 West, SLB&M, Tooele County, Utah. The Licensee also identifies other operations that are conducted by the Licensee and nearby facilities.

The proposed disposal site and activities for the CAC cell are conceptually the same as the previously approved CAN and Class A embankments. The CAC cell is designed as a primarily above grade landfill embankment.

Based on the information summarized above, the Division concludes that the proposed CAC cell and activities are acceptable.

References:

- Envirocare of Utah, LLC. 2005a.
- URS Corporation. 2005a.
- URS Corporation. 2005b.

4.3.4 Proposed Schedules

Requirement 2506-4 [URCR R313-25-6(3)]

Basis: The information contained in the CAC cell AR and other relevant documents (engineering reports, supplemental data submissions and interrogatory responses) the Licensee has submitted indicate that the requirements of URCR R313-25-6(4) have been met. The information includes schedules for construction, receipt, and first emplacement of waste. From the time the license is amended, the Licensee has projected construction to begin following technical review and revision of licensing and permitting documents (EnergySolutions 2006a, Introduction). This could be in early 2007 with disposal shortly following later in 2007. The proposed lifespan increase is approximately 10 years.

References:

- EnergySolutions, LLC. 2006a.
- Envirocare of Utah, LLC. 2005a.

4.4R313-25-7; SPECIFIC TECHNICAL INFORMATION

4.4.1 Natural and Demographic Disposal Site Characteristics

Requirement 2507-1 [URCR R313-25-7(1)]

Basis: The natural and demographic disposal site characteristics were discussed in the 2005 LRA and the CAN cell AR (URS Corporation 2005a; 2005b). The Licensee has identified no changes from these documents in the CAC cell AR or other relevant documents (engineering reports, supplemental data submissions and interrogatory responses).

Based on the information summarized above, the Division concludes that the proposed CAC cell natural and demographic site characteristics are acceptable.

References:

- EnergySolutions, LLC. 2006a.
- Envirocare of Utah, LLC. 2005a.
- URS Corporation. 2005a.
- URS Corporation. 2005b.

4.4.2 Principal Design Features: Descriptions, Design Criteria, Justification, and Codes

Requirement 2507-2 and Requirement 2507-3 [URCR R313-25-7(2) and -7(3)]

Basis: These requirements do not apply equally to all principal design features: One principal design feature might perform the required function of minimizing contact between water and disposed LLRW but would play no role in protecting against inadvertent intrusion. In contrast, another might perform the required function of protecting against inadvertent intrusion but have nothing to do with structural stability of the disposed LLRW. Thus, the applicability of the various regulatory requirements dealing with the design of principal design features depends upon each individual feature.

In this SER, all information required by the regulations for a single design feature is presented in one SER section. For example, the Clay Liner is addressed in Section 3.2.1.1 (a description of the Clay Liner design in Section 4.4.2.1.1, its design criteria in Section 4.4.2.5.2, its design basis and justification of the design criteria in Section 4.4.2.5.3, and applicable codes and standards considered in Section 4.4.2.1.4). The principal design features addressed are the following:

- Clay Liner
- Waste Placement and Backfill
- Cover
- Drainage system
- Buffer Zone

In the following sections, each principal design feature is addressed. Each principal design feature is described, its design criteria identified, justification that it will perform as required is presented, and the codes and standards applicable to design and construction are summarized. To ensure that no applicable regulatory requirement is overlooked, each applicable regulatory requirement is repeated as each principal design feature is taken up in the SER. Note that regulatory requirements whose satisfaction the Division judged not to be affected by the changes in the proposed CAC cell are not addressed, as enumerated in Table 1 of this SER.

The provisions of URCR R313-25-7(2) identify 11 required functions that the principal design features must perform. These are listed below:

- Minimize infiltration of water.
- Ensure integrity of covers for disposal units.
- Ensure structural stability of backfill, wastes, and covers.
- Minimize contact of wastes with standing water.
- Provide disposal site drainage.
- Ensure disposal site closure and stabilization.
- Eliminate to the extent practicable long-term disposal site maintenance.
- Protect against inadvertent intrusion (not applicable to disposal of Class A waste)
- Limit occupational exposures.
- Provide for disposal site monitoring.
- Provide a buffer zone for monitoring and potential mitigative measures.

The Licensee has determined that the principal design features identified perform the required functions, as indicated in the table below. Entries in the table indicate that all required functions are performed by at least one principal design feature.

Table 6. Summary of Principal Design Features and the Required Functions they Perform

Required Function	Complementary Functions Performed by Principal Design Feature				
	Clay Liner	Waste Emplacement and Backfill	Cover	Drainage Systems	Buffer Zone
Minimize infiltration	•	•	<ul style="list-style-type: none"> • Provide low permeability materials • Encourage runoff • Prevent desiccation • Limit frost penetration • Limit biointrusion 	•	•
Ensure cover integrity	<ul style="list-style-type: none"> • Mitigate differential settlement 	<ul style="list-style-type: none"> • Mitigate differential settlement 	<ul style="list-style-type: none"> • Mitigate differential settlement • Prevent internal erosion • Material stability/endure weathering, external erosion 	•	•
Reduce exposures	•	•	<ul style="list-style-type: none"> • Surface dose rates 	•	•
Ensure structural stability	•	<ul style="list-style-type: none"> • Maintain slope stability 	<ul style="list-style-type: none"> • Settlement • Maintain slope stability 	•	•
Minimize contact of wastes with standing water	<ul style="list-style-type: none"> • Minimize contact of wastes with standing water during operations • Minimize contact of wastes with standing water after closure 	•	•	•	•

Required Function	Complementary Functions Performed by Principal Design Feature			
	Clay Liner	Waste Emplacement and Backfill	Cover	Drainage Systems
Provide site drainage	•	•	•	<ul style="list-style-type: none"> • Facilitate flow away from the embankment • Minimize infiltration under flood conditions
Ensure ditch integrity	•	•	•	<ul style="list-style-type: none"> • Prevent internal erosion
				•

References:

- AMEC Earth & Environmental, Inc. 2005a.
- Envirocare of Utah, LLC. 2005a.
- URS Corporation. 2005a.
- URS Corporation. 2005b.
- Whetstone Associates, Inc. 2005.
- EnergySolutions, 2006a

4.4.2.1 Clay Liner

4.4.2.1.1 Description of Design Feature – Clay Liner

Requirement 2507-2 [URCR R313-25-7(2)]

Basis: The clay liner proposed for the CAC cell is identical to that approved for the Class A and CAN embankments. The CAC cell clay liner system consists of a prepared foundation overlain by a two-foot thick layer of 1×10^{-6} cm/sec permeability clay. The clay liner of the proposed CAC cell is described in Section 2.1 of the CAC cell Engineering Justification Report [(EJR), EnergySolutions, 2005d)]:

Because the CAC cell clay liner system design is identical to that previously approved for use in the Class A and CAN disposal embankments, it is also acceptable for use in the CAC cell. Based on the information summarized above, the Division concludes that the Licensee's proposed CAC cell clay liner description is acceptable.

References:

- EnergySolutions, LLC. 2005a.
- EnergySolutions, LLC. 2005b.
- EnergySolutions, LLC. 2006a
- EnergySolutions, LLC. 2006b
- Envirocare of Utah, LLC. 2005a.
- URS Corporation. 2005a.
- URS Corporation. 2005b.
- "CWF Cross Sections," Engineering drawing 05054-C06, Revision 1, April 6, 2006.

4.4.2.1.2 Principal Design Criteria – Clay Liner

Requirement 2507-3 [URCR R313-25-7(3)]

Basis: Table 7 of this SER summarizes the functions required of the CAC cell clay liner. Required and complementary functions of the CAC clay liner include:

- Minimize contact of wastes with standing water, both during operations and after closure.
- Ensure cover integrity by mitigating differential settlement (to which secondary settlement/consolidation of the materials underlying the waste placement and backfill contribute)

Section 1.1 of the CAC cell EJR (EnergySolutions, 2006b) provides information regarding the design criteria pertinent to the CAC clay liner. These design criteria are summarized in Table 7 with respect to each of its defined complementary design functions.

Table 7. Summary of CAC Cell Clay Liner Design Criteria

Required Function	Design Criteria
Minimize contact of wastes with standing water during operations.	The Clay Liner will be constructed with a permeability no less than 1×10^{-6} cm/sec, which is sufficient to encourage water accumulation rather than allowing infiltration. To supplement this operational requirement during operations, any water ponds or pools on top of the clay liner will immediately be removed by active means such as vacuuming or pumping.
Minimize contact of wastes with standing water following closure. That is, the rate of water enters the disposal unit must be less than the rate at which water leaves.	The clay Liner will be constructed with a permeability that is greater than that of the Radon Barrier to ensure that the rate of water entering the disposal unit is less than the rate at which it leaves via infiltration into underlying materials.
Ensure integrity of cover by mitigating differential settlement	Foundation and Clay Liner settlement will be limited (through design and construction) in concert with settlement within waste placement and backfill such that distortion in the Cover System does not exceed 0.02 ft/ft (vertical to horizontal).

The principal design criteria for the clay liner of the proposed CAC cell are identical to those approved for the Class A and CAN embankments. The conditions upon which the principal design criteria are based are similar, except for the corridor between the Class A and CAN embankments, to which the same criteria apply.

The CAC clay liner system design bases, being identical to that previously approved for use in the Class A and CAN disposal embankments, are also acceptable for use in the CAC cell. Based on the information summarized above, the Division concludes that the Licensee's proposed CAC cell principal design criteria are acceptable.

References:

- EnergySolutions, LLC. 2006b.
- Envirocare of Utah, LLC. 2005a.

4.4.2.1.3 Design Basis Conditions and Design Criteria Justification – Clay Liner

Requirement 2507-4 [URCR R313-25-7(4)]

Basis: Section 3.1 of the CAC cell EJR (EnergySolutions, 2006b) presents the projected performance of the CAC clay liner under normal, abnormal, and accident conditions. Table 1.2 of the CAC cell EJR summarizes the conditions considered in the design of the CAC clay liner. Table 1.4 of the CAC cell EJR presents and Table 8 below summarizes the results of evaluations of the projected performance of the CAC clay liner.

Table 8. Comparison of Required and Achieved Conditions for CAC Clay Liner

Parameter	Criterion	Condition Required
Liner Permeability	Must be less than 1×10^{-4} cm/sec	CQA/QCM requires no greater than less than 1×10^{-6} cm/sec which is less than 1×10^{-4}
Liner Permeability	Must be greater than Cover permeability	Liner permeability (1×10^{-6} cm/sec) is greater than smallest cover (radon barrier) permeability (1×10^{-8} cm/sec)
Cover System Distortion	Must be less than 0.02 ft/ft	Maximum distortion projected (under abnormal conditions) to be 0.007 ft/ft which is less than 0.02 ft/ft

Because the CAC cell clay liner system is identical to that previously approved for use in the Class A and CAN disposal embankments, it is also acceptable for use in the CAC cell. Based on the information summarized above, the Division concludes that the Licensee's proposed CAC clay liner is acceptable.

References:

- EnergySolutions, LLC. 2006a.
- Envirocare of Utah, LLC. 2005a.

4.4.2.1.4 Applicable Codes and Standards – Clay Liner

Requirement 2507-5 [URCR R313-25-7(5)]

Basis: The primary standards considered by the Licensee in the design of the CAC clay liner are those codified in URCR R313-25-24. The CAC cell AR invokes provisions of the CQA/QC Manual, Revision 19h (EnergySolutions 2006b) for constructing the CAC clay liner and associated items, and QC and QA procedures to be used during its construction.

The construction and standards that apply to the CAC clay liner system, being identical to that previously approved for use in the Class A and CAN disposal embankments, it is also acceptable for use in the CAC cell. Based on the information summarized above, the Division concludes that the Licensee's proposed CAC cell is acceptable.

References:

- EnergySolutions, LLC. 2006a
- EnergySolutions, LLC. 2006b
- Envirocare of Utah, LLC. 2005a.

4.4.2.2 Class A Waste Emplacement and Backfill

4.4.2.2.1 Description of Design Feature – Waste Emplacement

Requirement 2507-2 [URCR R313-25-7(2)]

Basis:

Waste Placement

EnergySolutions proposes no changes to waste placement procedures, equipment used, or forms used in documenting waste placement as a result of permitting the CAC cell. No revisions to the LLRW Construction Quality Assurance Quality Control (CQA/QC) Manual will be made in waste placement within the CAC cell. Waste placement in the CAC cell will be done in accordance with the current approved CQA/QC Manual (EnergySolutions 2006b) or any subsequent revision to the CQA/QC Manual approved by the DRC. The only changes to waste placement are to the overall size and dimensions of the waste embankment. Settlement due to the heightened embankment is discussed elsewhere in this report.

Based on the information summarized above, the Division concludes that the Licensee's proposed CAC cell Waste Placement is acceptable.

Debris and Large Component Placement:

The disposal of debris and containerized waste proposed for the CAC cell are identical to those approved for the Class A and CAN embankments (URS Corporation 2005a; 2005b). The conditions upon which the disposal is based are similar, except the overall height and surface area of the CAC cell are changed to increase the volume of disposed material in the embankment. CAC cell analyses (EnergySolutions 2006a Section 2.2) demonstrate that the disposal of debris and containerized waste within the CAC cell will perform at least as well as corresponding items approved for the Class A and CAN (URS Corporation 2005a Section 4.3) embankments.

Based on the information summarized above, the Division concludes that the Licensee's proposed CAC cell disposal of debris and containerized waste is acceptable.

Bulk Waste Placement:

The Bulk Waste Placement proposed for the CAC cell is identical to those approved for the Class A and CAN embankments (URS Corporation 2005a; 2005b). The conditions upon which the bulk waste placement is based are similar, except for overall expected volume of waste to be disposed. CAC cell analyses (EnergySolutions, LLC. 2006a Section 2.2) demonstrate that the bulk waste placement of the CAC cell will perform at least as well as corresponding items approved for the Class A and CAN (URS Corporation 2005a Section 4.3) embankments.

Based on the information summarized above, the Division concludes that the Licensee's proposed CAC cell bulk waste placement is acceptable.

References:

- EnergySolutions, LLC. 2006a
- EnergySolutions, LLC. 2006b.
- Envirocare of Utah, LLC. 2005b.
- URS Corporation. 2005a.
- URS Corporation. 2005b.

4.4.2.2.2 Principal Design Criteria– Waste Emplacement

Requirement 2507-3 [URCR R313-25-7(3)]

Basis: The principal design criteria pertinent to the design of the waste placement and backfill are listed in Table 6 and Table 1.2 of the CAC cell Engineering Justification Report, dated April 28, 2006, and justified in Section 4.2 of the AMEC 2005b “Combined Embankment Study.” A key design criterion is the limitation of allowable distortion in the cover to less than 0.02 ft/ft (V:H). That is, the waste placement and backfill must not result in a magnitude of differential settlement within the disposal embankment that would contribute to a distortion that exceeds 0.02 ft/ft in the cover.

The principal design criteria proposed for the CAC cell are identical to those approved for the Class A and CAN embankments. CAC cell analyses (AMEC 2005b) demonstrate that the criteria of the CAC cell will perform at least as well as corresponding items approved for the Class A and CAN embankments

Based on the information summarized above, the Division concludes that the Licensee’s proposed CAC cell principal design criteria are acceptable.

References:

- AMEC Earth & Environmental, Inc. 2005b.
- EnergySolutions. 2006a.
- URS Corporation. 2005a.

**4.4.2.2.3 Design Basis Conditions and Design Criteria
Justification– Waste Emplacement**

Requirement 2507-4 [URCR R313-25-7(4)]

Basis: Projected performance of the containerized waste placement and backfill is presented and justified in Section 2.2 and summarized in Table 1.4 of the CAC cell Engineering Justification Report (EnergySolutions 2006a). The Licensee utilized applicable guidance issued by the NRC, including those described in NRC NUREG-1199 and NUREG-1200, pertaining to normal, abnormal, and accident (where applicable) conditions that should be considered during design of NRC-licensed LLRW disposal facilities. Table 1.2 of the CAC cell EJRs summarizes the conditions considered in the design of the Class A Waste Placement and Backfill principal

design feature and the relationship between the normal, and abnormal, and accident (as applicable) conditions evaluated to the principal design criteria. Table 1.4 of the CAC cell EJR summarizes the results of evaluations conducted to assess the projected performance of the Class A Waste Placement and Backfill.

The design basis conditions and design criteria justification proposed for the CAC cell is identical to that approved for the Class A and CAN embankments (URS Corporation 2005a; 2005b). CAC cell analyses (CAC cell EJR Section 4.3) demonstrate that the design basis conditions and justification of the CAC cell will perform at least as well as corresponding items approved for the CAN embankments and the 2005 LRA (URS Corporation 2005a; 2005b).

Based on the information summarized above, the Division concludes that the Licensee's proposed CAC cell design basis conditions and design criteria justification is acceptable.

References:

- EnergySolutions, LLC. 2006a.
- US Nuclear Regulatory Commission, Division of Low-Level Waste Management and Decommissioning. 2001.
- US Nuclear Regulatory Commission, Office of Nuclear Material Safety and Safeguards. 2004.
- URS Corporation. 2005a.
- URS Corporation. 2005b.

**4.4.2.2.4 Applicable Codes and Standards– Waste
Emplacement**

Requirement 2507-5: [URCR R313-25-7(5)]

Basis: The primary standards considered by the Licensee in the design of the CAC cell Cover System are those codified in URCR R313-25-7(5). The CAC cell AR invokes provisions of the CQA/QC Manual, Revision 19h (EnergySolutions, 2006b) for placing waste in the disposal unit and associated items, and QC and QA procedures be used during its construction.

The construction and standards that apply to the CAC cell waste placement system, being identical to that previously approved for use in the Class A and CAN disposal embankments, it is also acceptable for use in the CAC cell. Based on the information summarized above, the Division concludes that the Licensee's proposed CAC cell is acceptable.

References:

- EnergySolutions, LLC. 2006b.

4.4.2.3 Cover Design

4.4.2.3.1 Description of Design Feature – Cell Cover

Requirement 2507-2: [URCR R313-25-7(2)]

Basis: The cover of the proposed embankment is described in Sections 2.3 and 3.3 of the CAC cell EJR (EnergySolutions 2006a). The Cover is depicted on Drawings 05054 C01 “Plan view,” 05054 C02 Cross Sections, and 05054 C03 “Details.” As shown in Detail 1 and 2 of Drawing 05054-C03, the LLRW CAC cell cover is a multi-layer system consisting from bottom to top of a two-layer compacted clay radon barrier, lower granular filter zone (“Type B” Filter Zone), sacrificial soil layer, upper granular filter zone (Type A Filter Zone), and erosion (rock rip rap) barrier layer. Table 1.3 of the 2006 EJR provides material specifications for each layer of the cover. The top slope of the cover would be sloped at 4 percent, with the top slope inclined away from a flat level center crest line oriented north-south. Side slopes of the cover would be sloped at 20 percent (5H:1V).

The radon barrier layer is unchanged from that approved for the class A and CAN embankments

A twenty-four-inch-thick lower (“Type B”) filter zone, consisting of small and medium aggregate layers, with an overlying sacrificial soil layer, would be placed directly over the radon barrier. The sacrificial soil layer would serve as a freeze/thaw barrier layer above the lower filter zone. Specifications for the thickness of and gradation requirements for this layer (D_{100} of 1 ½ inch or less, D_{40} of 3/8 inch or more, and D_{10} of No. 4 sieve (4.75 mm) or more) are found in Table 1.3 of the 2006 EJR. In addition, the filter materials for this layer would have a rock score of at least 50, and the constructed layer would exhibit a minimum saturated hydraulic conductivity (permeability) of 3.5 cm/sec.

Results of analyses of infiltration through the cover system are dominated by infiltration through the side slopes. This is true for at least two reasons:

- All water that runs off from the top slopes must traverse the side slopes as it flows from higher to lower elevations.
- The travel time to compliance monitoring wells for water that infiltrates through the side slopes is shorter than for water infiltrating through the top slopes since it is nearer the compliance monitoring wells.

The Type B Filter zone proposed for the CAC cell is unchanged from that approved for use in the Class A and Class A North cells, except that the Type B filter zone has been expanded from a 6-inch layer in the Class A and CAN cells to a 24-inch layer in the CAC cell. The PATHRAE fate and transport modeling for the side slope with a 24-inch thick Type-B filter indicates that all radionuclides modeled would remain below the GWPLs for at least 500 years at a compliance well located 90 feet from the edge of the waste, provided that the in-place concentrations of seven radionuclides (berkelium-247, calcium-41, chlorine-36, iodine-129, rhenium-187, strontium-90, and technitium-99) satisfy the constraints stated in Table 11 of this document. All other modeled constituents would meet the groundwater standard if placed under the side slope at Class A limits. CAC cell analyses (Whetstone 2006a; 2006b) demonstrate that the cover system of the CAC cell will perform at least as well as corresponding items approved for the Class A and CAN embankments.

The sacrificial soil layer, upper, six-inch-thick (“Type A”) filter zone, and erosion barrier proposed for the CAC cell are all unchanged from those approved for use in the Class A and Class A North cells.

With the exception of the Type B filter zone, which is designed to function more effectively in the proposed CAC cell cover system, the cover system proposed for the CAC cell is identical to that approved for the Class A and CAN embankments (URS Corporation 2005a; 2005b). CAC cell.

Based on the information summarized above, the Division concludes that the Licensee’s proposed CAC cell cover system is acceptable.

References:

- EnergySolutions, LLC. 2006a.
- URS Corporation. 2005a.
- URS Corporation. 2005b.
- Whetstone Associates, Inc. 2006a.
- Whetstone Associates, Inc. 2006b.

4.4.2.3.2 Principal Design Criteria – Cell Cover

Requirement 2507-3: [URCR R313-25-7(3)]

Basis: Section 1.3 of the CAC cell EJR provides information regarding the design criteria pertinent to the Cover principal design feature of the Disposal Embankment. Section 1.0 and Table 1.2 of the CAC cell EJR summarize the principal design criteria for the Cover.

The design criteria used by the Licensee for each required function of the cover are summarized in “Table 9. Summary of Cover Design Criteria”:

Table 9. Summary of Cover Design Criteria

Required Function	Design Criteria Used
Provide inadvertent intruder barrier	Top of cover shall be a minimum of (5.5 feet) above the top of any Class A wastes
<ul style="list-style-type: none"> • Minimize infiltration • Encourage runoff 	<ul style="list-style-type: none"> • Average infiltration rate through cover < 0.096 in./yr (0.244 cm/yr) for top slopes and < 0.177 in./yr (0.451 cm/yr) for side slopes • Surface slope must be adequate to maintain positive drainage; • Maximum calculated design velocity within the drainage layer must be greater than the predicted maximum drainage velocity for extreme storm events; and • Accumulation of water must not occur on the surface of the embankment

Required Function	Design Criteria Used
Protect the radon barrier from desiccation	No desiccation cracking allowed in radon barrier
Protect the radon barrier from frost damage	Thickness of rock erosion barrier plus sacrificial soil plus filter zone layers > maximum projected depth of frost penetration (maximum frost depth estimated based on a minimum 500-year recurrence interval)
Limit biointrusion-related damage to radon barrier	Cover shall discourage biointrusion and shall not cause infiltration through cover to increase above base case infiltration levels
Limit occupational exposures (by limiting exposures at the cover surface)	Dose rate at cover surface shall be less than 100 mrem total effective dose equivalent (TEDE) per year
Ensure cover integrity <ul style="list-style-type: none"> • Mitigate differential settlement • Prevent internal erosion • Exhibit material stability and resist external erosion 	<ul style="list-style-type: none"> • Maximum allowable distortion of cover shall be 0.02 ft/ft (v:h) • Runoff water velocity shall be < 3 feet/sec on surface of radon barrier and to minimize piping, particle size specification for Type B Filter Zone material shall conform to the following: <ul style="list-style-type: none"> • $D_{15}(\text{filter})/D_{85}(\text{soil})$ shall not exceed 5; and • $D_{50}(\text{filter})/D_{50}(\text{soil})$ shall not exceed 25 • Rock erosion barrier shall exhibit internal stability and endure weathering/external erosion for at least 1,000 years
Ensure Structural Stability <ul style="list-style-type: none"> • Withstand settlement without damage • Maintain slope stability 	<ul style="list-style-type: none"> • Total settlement shall be less than 15 percent of embankment height in order to not compromise drainage capability of cover (i.e., cause slope reversal) • Embankment shall meet minimum global factor of safety against sliding instability of 1.5 under static conditions and 1.2 under dynamic (earthquake) condition

The principal design criteria proposed for the CAC cell are identical to those approved for the Class A and CAN embankments. CAC cell analyses (EnergySolutions 2006a Section 1) demonstrate that the cover system of the CAC cell will perform at least as well as corresponding items approved for the CAN and Class A embankments.

Based on the information summarized above, the Division concludes that the Licensee's proposed CAC cell design criteria for the cover system is acceptable.

References:

- EnergySolutions, LLC. 2006a.

4.4.2.3.3 Design Basis Conditions and Design Criteria Justification – Cell Cover

Requirement 2507-4 [URCR R313-25-7(4)]

Basis:

Provide Inadvertent Intruder Barrier

Utah regulations require an intruder barrier for the disposal of only Class C LLRW. Since only Class A waste will be disposed of in the proposed Disposal Embankment, no intruder barrier, as defined by Utah regulations, is required. In a more general sense, however, intruder protection is required by the performance objective stated in URCR R313-25-20. These more general requirements are satisfied by the remoteness of the facility from large population centers, the cover system provided to separate the waste from the atmosphere, physical access barriers erected and maintained at the closed facility, access controls maintained at the closed facility, and monuments placed denoting the locations embankment boundaries.

Based on the information summarized above, the Division concludes that the Licensee's proposed CAC cell inadvertent intruder barrier is acceptable.

Minimize Infiltration

The required function of minimizing infiltration is evaluated via five complementary aspects: minimize infiltration, encourage runoff, provide protection against desiccation damage, provide protection against frost penetration damage, and provide protection against biointrusion-related damage.

Minimizing infiltration for proposed CAC is accomplished with cover components that are, with one exception, identical to those approved for the Class A and CAN embankments. The thickness of the type B filter zone has been increased from 6 inches to 24 inches to more effectively allow water to runoff instead of infiltrate. CAC cell analyses (CAC cell EJR Section 1.3.1) demonstrate that infiltration into the CAC cell will be no greater than that already projected and approved for the Class A and CAN embankments.

Based on the information summarized above, the Division concludes that the Licensee's proposed CAC cell program for minimizing infiltration is acceptable.

Minimize Infiltration - Encourage Runoff

The three design criteria selected for evaluating surface drainage from the embankment are intended to ensure that runoff of precipitation that falls on the surface of the completed embankment will be maintained and maximized under expected, as well as extreme, future environmental conditions. By maximizing runoff, the design approach of minimizing the volume of precipitation available to infiltrate into the embankment can be achieved.

The evaluations of runoff performed by EnergySolutions and accepted by the Division indicate that runoff from the CAC cell will be greater than runoff from for the already-approved CAN and Class A embankments.

Based on the information summarized above, the Division concludes that the Licensee's proposed CAC cell runoff control is acceptable.

Provide Protection from Effects of Desiccation

The selected design criterion that there be no desiccation cracking of the radon barrier clay is based on the fact that the top foot of radon barrier clay is the primary infiltration barrier, and, therefore, the efficiency of this barrier must not be compromised by desiccation effects. With the exception of the thicker Type B filter zone provided for the CAC cell cover system (24 inches in contract to 6 inches for the Class A and CAN cells), the cover design is identical to that already approved for use with the Class A and CAN cells. The thicker Type B filter zone provides additional protection to the underlying clay layers that require protection against drying that causes desiccation. The additional protection provided by the thicker Type B filter zone provides additional justification for approving the proposed CAC cell cover system design.

The potential for desiccation of clay in the proposed CAC cell cover system is less than that already approved for the CAN and Class A embankments. CAC cell analyses (CAC cell EJR Section 3.3.1.3) demonstrate that the effects of desiccation of the CAC cell will perform at least as well as corresponding items approved for the Class A and CAN embankments.

Based on the information summarized above, the Division concludes that the Licensee's proposed CAC cell effects of desiccation are acceptable.

Provide Protection from Effects of Frost Penetration

With the exception of the thicker Type B filter zone provided for the CAC cell cover system (24 inches in contract to 6 inches for the Class A and CAN cells), the cover design is identical to that already approved for use with the Class A and CAN cells. The thicker Type B filter zone provides additional protection to the underlying clay layers that require protection against damage caused by freezing. The additional protection provided by the thicker Type B filter zone provides additional justification for approving the proposed CAC cell cover system design.

The potential for frost penetration proposed for the CAC cell is less than that approved for the CAN and Class A embankments. CAC cell analyses (CAC cell EJR Section 3.3.1.4) demonstrate that the frost protection of the CAC cell will perform at least as well as corresponding items approved for the Class A and CAN embankments.

Based on the information summarized above, the Division concludes that the Licensee's proposed CAC cell frost protection is acceptable.

Limit Biointrusion-Related Damage

The Licensee-selected design criterion that the cover design must discourage plant growth and accommodate indigenous species growth without increasing infiltration above the base case

modeled in the (Appendix T to the 2005 LRA) is based on the fact that the top foot of radon barrier clay is the primary infiltration barrier, and, therefore, the hydraulic barrier efficiency of this barrier must not be compromised, by plant root penetration. The Licensee arranged for botanical specialists to conduct a literature review regarding typical plant rooting depths for shrub species identified growing at and around the Clive facility and to conduct a reconnaissance of the site to confirm vegetation types and a subsurface testing program to verify the depth of root penetration of one deeper-rooted indigenous shrub species growing at the site (Black greasewood). Based on the results of this work, the Licensee acknowledged that it might not be possible to totally prevent establishment of vegetation on the cover following the 100-year period of institutional controls.

The biointrusion barrier proposed for the CAC cell is identical to that approved for the Class A and CAN embankments. CAC cell analyses (CAC cell EJR Section 3.3.1.5) demonstrate that the biointrusion barrier of the CAC cell will perform at least as well as corresponding items approved for the Class A and CAN embankments (2005 CAN SER Section 5.2.2.3).

Based on the information summarized above, the Division concludes that the Licensee's proposed CAC cell biointrusion barrier is acceptable.

Limit Occupational Exposures

The occupational exposures projected for the proposed CAC cell are no greater than those approved for the Class A and CAN embankments. CAC cell analyses (CAC cell EJR Section 3.3.2) demonstrate that the occupational exposures of the CAC cell will perform at least as well as corresponding items approved for the Class A and CAN embankments (2005 CAN SER Section 5.2.3.3).

Based on the information summarized above, the Division concludes that the Licensee's proposed CAC cell occupational exposures are acceptable.

Allow Site Monitoring

EnergySolutions submitted a settlement monitoring plan on December 20, 2005, as a part of its Computer Aided Earthmoving System (CAES) proposal for waste placement. The Division reviewed and issues a conditional approval to those changes on April 12, 2006. A condition of that approval was that EnergySolutions submit a revision to the CQA/QC Plan to address the implementation of its CAES proposal. EnergySolutions submitted that revision on May 1, 2006 and the Division is currently reviewing it.

Settlement has been evaluated as a random process using both calculated and actual settlement monitoring data generated from the LARW embankment. The random calculation was based on 50-foot spacing between analysis points; yet used data based on 100-foot spacing; thereby essentially incorporating a factor of safety of two in the analysis. The analysis concludes that distortions will be less than 0.02 ft/ft (AMEC 2005a, Section 4.3.2).

The site settlement monitoring proposed for the CAC cell are identical to those approved for the Class A and CAN embankments. The conditions upon which the settlement monitoring is based are similar, except for incorporation of current actual settlement monitoring data. CAC cell

analyses (CAC cell EJR Section 3.3.3.1) demonstrate that the settlement monitoring of the CAC cell will perform at least as well as corresponding items approved for the Class A and CAN embankments (2005 CAN SER Section 5.2.3.3).

Based on the information summarized above, the Division concludes that the Licensee's proposed CAC cell settlement monitoring is acceptable.

Ensure Cover Integrity

Ensuring cover integrity involves the following five complementary functions:

- Mitigate Differential Settlement
- Prevent Internal Erosion
- Maintain Material Stability/Withstand External Erosion
- Ensure Structural Stability – Settlement
- Ensure Structural Stability – Maintain Slope Stability

These complementary functions are addressed in the following paragraphs.

Mitigate Differential Settlement

Results of differential settlement design requirements and projections are presented in Section 3.3.3.1 of the CAC cell EJR. These results indicate that the maximum projected differential settlement between adjacent points was estimated by the Licensee to be about 0.5 ft, leading to calculated distortion ranging from 0.002 to 0.01 ft/ft (AMEC 2005a). With the design criterion for distortion in the CAC cell cover of 0.02 ft/ft this criterion is easily satisfied.

Based on the information summarized above, the Division concludes that the Licensee's proposed CAC cell differential settlement is acceptable.

Prevent Internal Erosion

The internal erosion calculations and subsequent design proposed for the CAC cell are identical to those approved for the Class A and CAN embankments. CAC cell analyses (2005 CAC cell EJR Section 3.3.3.2) demonstrate that the erosion prevention measures of the CAC cell will perform at least as well as corresponding items approved for the Class A and CAN embankments.

Based on the information summarized above, the Division concludes that the Licensee's proposed CAC cell internal erosion prevention measures are acceptable.

Maintain Material Stability/Withstand External Erosion

The rock cover design calculations proposed for the CAC cell are identical to those approved for the Class A and CAN embankments. CAC cell analyses (2005 CAC cell AR Section 3.3.3.3) demonstrate that the rock cover design calculations of the CAC cell will perform at least as well as corresponding items approved for the Class A and CAN embankments.

Based on the information summarized above, the Division concludes that the Licensee's proposed CAC cell for material stability and external erosion control is acceptable.

Ensure Structural Stability - Settlement

CAC cell AR Section 3.3.4.1 addresses settlement within foundation materials, waste placement, backfill, and cover system. Total long-term settlement of compressible debris lifts was evaluated in Section 4.2.3 and Figure 16 of AMEC 2005a. In addition, four years of EnergySolutions settlement data were analyzed and a profile of LARW embankment settlement generated that supports the work performed by AGRA, 2000a and AGRA 2000b (AMEC 2005a). LARW settlement monitoring data indicate that the rate of settlement decreases significantly within 12 to 24 months of placement. This data support the analytical conclusions that the majority of settlement will occur within the first year of placement and that settlement that occurs thereafter will be minimal and within the limits projected by earlier work (AGRA, 1000a). The total magnitude of settlement measured over a four year period of time at the LARW cell is less than 4.6 feet (AMEC 2005a).

The conclusions of settlement calculations for the proposed CAC cell are comparable to those approved for the Class A and CAN embankments. The conditions upon which the settlement calculations are based are similar, except for the use of more current data which adds further evidence and credibility to the calculations. CAC cell analyses (2005 CAC cell AR Section 3.3.4.1) demonstrate that the settlement calculations of the CAC cell will perform at least as well as corresponding items approved for the Class A and CAN embankments.

Based on the information summarized above, the Division concludes that the Licensee's proposed CAC cell settlement analysis is acceptable.

Ensure Structural Stability - Maintain Slope Stability

The minimum factors of safety of 1.5 under static conditions and 1.2 under dynamic (i.e., earthquake) conditions that the Licensee selected for static and seismic conditions are contained in the State of Utah Statutes and Administrative Rules for Dam Safety, rule R625-11-6. These minimum recommended factors of safety were based on reviewing case histories of embankment dams founded on non-liquefiable clay foundations or bedrock, which demonstrated adequate performance under seismic conditions (Seed and Bonaparte, 1983).

The normal condition considers the performance of the embankment under static conditions. Two abnormal conditions were evaluated. The first evaluation for abnormal conditions compares the calculated safety factor inherent to the embankment design against the expected peak ground acceleration due to an earthquake that might affect the site. The second abnormal condition evaluated involved assuming saturated conditions occur within the embankment, as saturated soils may be more prone to liquefaction under earthquake conditions. The Licensee did not perform analyses of reduced structural stability associated with accidents (such analyses are not required per NUREG-1199, Section 3.2). The calculated minimum seismic factor of safety under abnormal conditions is 1.2 which meets the design criteria. Under normal conditions the minimum static factor of safety of 2.5 was calculated, which exceeds the design factor of safety of 1.5.

The slope stability analysis proposed for the CAC cell are identical to those approved for the Class A and CAN embankments. CAC cell analyses (2005 CAC cell EJR Section 3.3.4.2) demonstrate that the slope stability of the CAC cell will perform at least as well as corresponding items approved for the Class A and CAN embankments.

Based on the information summarized above, the Division concludes that the Licensee's proposed CAC cell slope stability analysis is acceptable.

References:

- AMEC Earth & Environmental, Inc. 2005a.
- Envirocare of Utah, LLC. 2004b.
- Envirocare of Utah, LLC. 2005a.
- US Nuclear Regulatory Commission, Division of Low-Level Waste Management and Decommissioning. 2001.
- URS Corporation. 2005a.
- URS Corporation. 2005b.
- Whetstone Associates, Inc. 2005.

4.4.2.3.4 Applicable Codes and Standards – Cell Cover

Requirement 2507-5 [URCR R313-25-7(5)]

Basis: The primary standards considered by the Licensee in the design of the CAC cell cover System are those codified in URCR R313-25-7(5). The CAC cell AR invokes currently approved provisions of the LLRW CQA/QC Manual (EnergySolutions, 2006b) for constructing the cover system and associated items, and QC and QA procedures be used during its construction.

The construction and standards that apply to the CAC cell cover system, being identical to that previously approved for use in the Class A and CAN disposal embankments, it is also acceptable for use in the CAC cell. Based on the information summarized above, the Division concludes that the Licensee's proposed CAC cell is acceptable.

Reference:

- AMEC Earth & Environmental, Inc. 2005a.
- Envirocare of Utah, Inc. 2004b.
- Envirocare of Utah, Inc. 2005b.
- URS Corporation. 2005a.
- URS Corporation. 2005b.
- Whetstone Associates, Inc. 2005.

- EnergySolutions 2006a.
- EnergySolutions 2006b.

4.4.2.4 Drainage Systems

4.4.2.4.1 Description of Design Feature – Drainage Systems

Requirement 2507-2 [URCR R313-25-7(2)]

Basis: Drainage systems proposed in conjunction with the CAC cell are described in Sections 3.4 of the CAC cell EJR and are depicted on Drawings 05054- C01, and C03. The drainage systems are included in the design of the proposed CAC cell to control precipitation and surface water run-on and run-off during operations. Drainage system components include a 4-foot-deep “V”-shaped perimeter drainage ditch, constructed with 5H:1V side slopes, to be installed adjacent to the toe of each embankment slope. Bottoms (bases) of drainage ditch segments would be constructed of either in-place CL or ML soils or imported CL or ML soil borrow materials compacted to at least 95 percent of the Standard Proctor density for the soils. The compacted bases would be overlain by a minimum 6-inch-thick layer of “type A” filter material, which in turn, would be overlain by either a minimum 12-inch-thick layer (on the portion of the ditch exterior to the ditch centerline) or minimum 18-inch-thick layer (on the portion of the ditch inside the centerline, i.e., the extended cover side slope side) of Type A rip rap material. The specifications for the Type A filter materials and Type A rip rap would be identical to the specifications identified for these materials in the cover system.

Analyses of drainage systems for existing cells and the proposed CAC cell demonstrate that all runoff will be contained within the bounds of the ditches provided along all sides of existing and the proposed CAC cells. Projected maximum water depths in ditches adjacent to the proposed CAC cell range from 2.61 to 2.74 ft, leaving estimated freeboard ranging from 1.26 to 1.39 ft.

All runoff from all embankments at the facility are channeled to the southwest corner of the site, and must pass through ditches adjacent to the existing 11.e(2) cell. The ditch with greatest flow is that along the south side of the 11.e(2) cell. The maximum water depth in this ditch under normal storm conditions (1.9 inches in 24 hours) is projected to be 3.83 ft, leaving 0.17 ft freeboard. Even under the abnormal storm condition (2.4 inches in 24 hours), the depth in the ditch on the south of the 11.e(2) cell is projected to be 3.98 ft.

Analyses of the potential for damage to the ditch due to excessive water velocities, given the characteristics of the ditches, reveal that the ditches and their component materials will be stable under expected conditions. Because slopes at the site are so gentle, velocities required to erode the ditch materials cannot be achieved.

The characteristics of the drainage ditches proposed for the CAC cell are identical to those approved for ditches intended to serve the Class A and CAN embankments.

The conditions upon which the drainage is based are similar, except for overall total length of drainage system. CAC cell analyses (2005 CAC cell EJR Section 3.4) demonstrate that the drainage system of the CAC cell will accommodate runoff under normal and abnormal

conditions without damaging the ditch materials and without exceeding the bounds of the ditches.

Based on the information summarized above, the Division concludes that the Licensee's proposed CAC cell drainage system is acceptable.

References:

- AMEC Earth & Environmental, Inc. 2005a.
- Envirocare of Utah, LLC. 2004b.
- Envirocare of Utah, LLC. 2005a.
- URS Corporation. 2005a.
- URS Corporation. 2005b.
- Whetstone Associates, Inc. 2005.

4.4.2.4.2 Principal Design Criteria – Drainage Systems

Requirement 2507-3 [URCR R313-25-7(3)]

Basis: Section 1.4 of the CAC cell EJR provides information regarding the design criteria pertinent to the Drainage system of the CAC cell. Table 1.2, Design Criteria of the Principal Design Features, summarizes the principal design criteria for the drainage system. Table 1.3 of the CAC cell EJR also provides a summary of some of the projected performance relating to the design of the CAC cell, including the drainage systems.

The principal design criteria proposed for the CAC cell drainage system are identical to those approved for the Class A and CAN embankments. CAC cell analyses (2005 CAC cell EJR Section 1.4) demonstrate that the drainage system of the CAC cell will accommodate runoff under normal and abnormal conditions without damaging the ditch materials and without exceeding the bounds of the ditches.

Based on the information summarized above, the Division concludes that the Licensee's proposed CAC cell design criteria for the drainage system is acceptable.

References:

- Envirocare of Utah, LLC. 2004b.
- Envirocare of Utah, LLC. 2005a.
- URS Corporation. 2005a.
- URS Corporation. 2005b.
- Whetstone Associates, Inc. 2005.

4.4.2.4.3 Design Basis Conditions and Design Criteria Justification – Drainage Systems

Requirement 2507-4 [URCR R313-25-7(4)]

Basis: Sections 1.4.1.1 and 1.4.1.2 of the CAC cell EJR provides information regarding the natural (meteorological, biological, and seismic) normal and abnormal conditions, and accident (as applicable) conditions under which the drainage systems of the proposed CAC cell were evaluated. In developing the CAC cell AR, the Licensee utilized applicable guidance issued by the NRC including those described in NRC NUREG-1199 and NUREG-1200, pertaining to normal, abnormal, and accident (where applicable) conditions that should be considered during design of NRC-licensed LLRW disposal facilities. Table 1.3 of the CAC cell EJR also summarizes the conditions considered in the design of the Drainage Systems principal design feature and the relationship between the normal, and abnormal, and accident (as applicable) conditions evaluated to the principal design criteria. Table 1.4 of the CAC cell EJR summarizes the results of evaluations conducted to assess the projected performance of the Drainage Systems principal design feature.

The design basis and criteria justification proposed for the CAC cell drainage system are identical to those approved for the Class A and CAN embankments. The conditions upon which the drainage system is based are similar, except for the overall length of the drainage system. CAC cell analyses (2005 CAC cell EJR Section 1.4.1) demonstrate that the drainage system of the CAC cell will accommodate runoff under normal and abnormal conditions without damaging the ditch materials and without exceeding the bounds of the ditches.

Based on the information summarized above, the Division concludes that the Licensee's proposed CAC design basis and criteria justification for the drainage system is acceptable.

Facilitate Flow of Precipitation Away from Embankment

The normal condition evaluated by the Licensee for the complementary function “facilitate flow of water away from the embankment included an analysis of the drainage ditch design with respect to impacts of the 25-year, 24-hour storm event for the site of 1.9 inches of rain (NOAA Atlas 2, Volume VI, Figure 28). The 25-year storm event was identified as representing the probable worst-case precipitation event that might be encountered during active site operations. The Licensee indicated that it selected the design criteria of ensuring that storm water remain within the drainage ditch system with a minimum of 0.5-foot freeboard, and ensuring that the drainage ditch system have sufficient slope to allow drainage away from the embankment, under these conditions, to “promote the collection of precipitation as well as promote flow away from the embankment, thus minimizing standing water adjacent to the embankment; thereby minimizing potential infiltration into the waste” (CAC cell EJR Section 1.4.1.1).

Calculations, described in Section 3.4.1.1 of the CAC cell EJR, using geometry and slope of the ditches and Manning's formula to arrive at design flow velocities and storage capacity of the drainage ditch system, address the design criteria established for the function of facilitating flow away from the embankment. Results of those calculations indicate that the ditches around the

CAC cell have been designed to have adequate capacity to contain the normal conditions storm event run off volume with approximately 1.2 feet of freeboard.

The calculation performed to facilitate flow away from the embankment proposed for the CAC cell (2005 CAC cell EJR Section 3.4.1.1) demonstrate that the CAC cell will accommodate runoff under normal and abnormal conditions without damaging the ditch materials and without exceeding the bounds of the ditches.

Based on the information summarized above, the Division concludes that the Licensee's proposed CAC cell flow calculation is acceptable.

Minimize Infiltration Under Flood Conditions

The drainage system performance proposed for the CAC cell to minimize infiltration under flood conditions are identical to those approved for the Class A and CAN embankments. CAC cell analyses (2005 CAC cell AR Section 3.4.1.2) demonstrate that the drainage system performance of the CAC cell will perform at least as well as corresponding items approved for the Class A and CAN embankments

Based on the information summarized above, the Division concludes that the Licensee's proposed CAC cell drainage system performance to minimize infiltration under flood conditions is acceptable.

Ensure Ditch Integrity

The Licensee evaluated a normal design condition that included evaluation of drainage system performance under the 100-year, 24-hour storm event of 2.4 inches of precipitation (NOAA Atlas 2, Volume VI, Figure 28).

Analyses of the potential for damage to the ditch due to excessive water velocities, given the characteristics of the ditches, reveal that the ditches and their component materials will be stable under expected conditions. Because slopes at the site are so gentle, velocities required to erode the ditch materials cannot be achieved.

The characteristics of the drainage ditches proposed for the CAC cell are identical to those approved for ditches intended to serve the Class A and CAN embankments.

The conditions upon which the drainage is based are similar, except for overall total length of drainage system. CAC cell analyses (2005 CAC cell EJR Section 3.4) demonstrate that the drainage system of the CAC cell will accommodate runoff under normal and abnormal conditions without damaging the ditch materials and without exceeding the bounds of the ditches.

Based on the information summarized above, the Division concludes that the Licensee's proposed CAC cell ditch integrity is acceptable.

References:

- AMEC Earth & Environmental, Inc. 2005a.
- Envirocare of Utah, LLC. 2004b.
- Envirocare of Utah, LLC. 2005a.
- Miller, John F., et al. 1973.
- Nelson, J.D., S.R. Abt, R.L. Volpe, D. van Zyle, N.E. Hinkle, and W.P. Staub. 1986.
- URS Corporation. 2005a.
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- US Nuclear Regulatory Commission, Division of Low-Level Waste Management and Decommissioning. 2001.
- US Nuclear Regulatory Commission, Office of Nuclear Material Safety and Safeguards. 2002.
- US Nuclear Regulatory Commission, Office of Nuclear Material Safety and Safeguards. 2004.
- Whetstone Associates, Inc. 2005.

4.4.2.4.4 Applicable Codes and Standards – Drainage Systems

Requirement 2507-5: [URCR R313-25-7(5)]

Basis: The primary standards considered by the Licensee in the design of the CAC cell drainage systems are those codified in URCR R313-25-7(5). The CAC cell EJR invokes currently approved provisions of the CQA/QC Manual, Revision 19h (EnergySolutions, 2006b) for constructing the cover system and associated items, and QC and QA procedures be used during its construction.

The construction and standards that apply to the CAC cell drainage system, being identical to that previously approved for use in the Class A and CAN disposal embankments, it is also acceptable for use in the CAC cell. Based on the information summarized above, the Division concludes that the Licensee's proposed CAC cell is acceptable.

References:

- AMEC Earth & Environmental, Inc. 2005a.
- Envirocare of Utah, Inc. 2004b.
- Envirocare of Utah, Inc. 2005b.
- URS Corporation. 2005a.
- URS Corporation. 2005b.
- Whetstone Associates, Inc. 2005.

4.4.2.5 Buffer Zone

4.4.2.5.1 Description of Design Feature – Buffer Zone

Requirement 2507-2: [URCR R313-25-7(2)]

Basis:

The Buffer Zones proposed for the CAC cell are identical to those approved for the Class A and CAN embankments. The conditions upon which the Buffer Zone is based are similar. The CAC cell analyses (CAC cell EJR Sections 1.5, 2.5, and 3.5) demonstrate that the Buffer Zones of the CAC cell will perform at least as well as corresponding items approved for the CAN embankments and the 2005 LRA (2005 CAN SER Sections 1.0 and 3.0; 2005 LRA SER Sections 3.1.5 and 3.3.5).

Based on the information summarized above, the Division concludes that the Licensee's proposed CAC cell Buffer Zones are acceptable.

References:

- Envirocare of Utah, LLC. 2005a
- Envirocare of Utah, LLC. 2005b
- Envirocare of Utah, LLC. 2005c.
- URS Corporation. 2005a.
- URS Corporation. 2005b.

4.4.2.5.2 Principal Design Criteria – Buffer Zone

Requirement 2507-3: [URCR R313-25-7(3)]

Basis: The design criterion established for the Buffer Zone is that it be adequately sized to allow site monitoring and corrective measures to be performed if necessary.

The Buffer Zone design proposed for the CAC cell is identical to that approved for the Class A and CAN embankments. The CAC cell analyses (CAC cell EJR Sections 1.5, 2.5, and 3.5) demonstrate that the Buffer Zones of the CAC cell will perform at least as well as corresponding items approved for the CAN embankments and the 2005 LRA (2005 CAN SER Sections 1.0 and 3.0; 2005 LRA SER Sections 3.1.5 and 3.3.5).

Based on the information summarized above, the Division concludes that the Licensee's proposed CAC cell Buffer Zones are acceptable.

References:

- Envirocare of Utah, Inc. 2005a
- Envirocare of Utah, Inc. 2005b
- Envirocare of Utah, Inc. 2005c

- URS Corporation. 2005a.
- URS Corporation. 2005b.

4.4.2.5.3 Design Basis Conditions and Design Criteria Justification – Buffer Zone

Requirement 2507-4: [URCR R313-25-7(4)]

- Basis:

The Buffer Zones proposed for the CAC cell are identical to those approved for the Class A and CAN embankments. The CAC cell analyses (CAC cell EJR Sections 1.5, 2.5, and 3.5) demonstrate that the Buffer Zones of the CAC cell will perform at least as well as corresponding items approved for the Class A and CAN embankments.

Based on the information summarized above, the Division concludes that the Licensee's proposed CAC cell Buffer Zones are acceptable.

References:

- Envirocare of Utah, Inc. 2005a.
- Envirocare of Utah, Inc. 2005b.
- Envirocare of Utah, Inc. 2005c.
- URS Corporation. 2005a.
- URS Corporation. 2005b.
- US Nuclear Regulatory Commission. 2004.
- Utah Division of Water Quality, Ground Water Quality Discharge Permit Number UGW450005.
- Whetstone Associates, Inc. 2005.

4.4.2.5.4 Applicable Codes and Standards – Buffer Zone

Requirement 2507-5: [URCR R313-25-7(5)]

Basis:

The Buffer Zones proposed for the CAC cell are identical to those approved for the Class A and CAN embankments. The CAC cell analyses (CAC cell EJR Sections 1.5, 2.5, and 3.5) demonstrate that the Buffer Zones of the CAC cell will perform at least as well as corresponding items approved for the CAN embankments and the 2005 LRA (2005 CAN SER Sections 1.0 and 3.0; 2005 LRA SER Sections 3.1.5 and 3.3.5).

Based on the information summarized above, the Division concludes that the Licensee's proposed CAC cell Buffer Zones are acceptable.

References:

- Envirocare of Utah, Inc. 2005a.
- Envirocare of Utah, Inc. 2005b.
- Envirocare of Utah, Inc. 2005c.
- URS Corporation. 2005a.
- URS Corporation. 2005b.
- Utah Division of Water Quality. Ground Water Quality Discharge Permit Number UGW450005.

4.4.3 Land Disposal Facility Construction and Operation

Requirement 2507-6: [URCR R313-25-7(6)]

Basis: The CAC cell construction and operation are identical to those approved for the Class A and CAN embankments. The procedures used in placing waste and constructing the embankment and for controlling and documenting the same are detailed in Revision 19h of the CQA/QCM (EnergySolutions, 2006b). Neither waste segregation or intruder barriers, as considered in URCR R313-25 is required since only Class A waste is received at the facility. Onsite traffic is controlled and restricted so that active waste disposal operations do adversely affect the stability and integrity of areas of the embankment already closed and stabilized. The surface water drainage system manages and protects the active or closed disposal embankment from the adverse effects of runoff and from runoff under suitably severe precipitation and flooding events.

The survey control program is described in Section 4.4.3.5 of this SER.

Access of surface water to the emplaced wastes is controlled during operations by actively removing accumulations in the disposal embankment by vacuuming or pumping it and either transferring it to an evaporation pond or applying it to active areas of the embankment for dust and compaction control. Following closure and stabilization, surface water is directed away from disposed waste by the configuration, slopes, dimensions and materials of the closed embankment and by the low [permeability of the embankment cover system. Access of groundwater to the emplaced wastes is controlled by ensuring that the bottom of the emplaced waste is above the historic high elevation of the water table by at least 13 feet (refer also to Section 4.4.3.7 of this SER).

The construction and operation of the proposed CAC cell being identical in principle, concept, and specification to that previously approved for use in the Class A and CAN disposal embankments, it is also acceptable for use in the CAC cell. Based on the information summarized above, the Division concludes that the Licensee's proposed CAC cell is acceptable.

References:

- AMEC Earth & Environmental, Inc. 2005a.
- EnergySolutions, 2006b

- Envirocare of Utah, LLC. 2004b.
- Envirocare of Utah, LLC. 2005a.
- URS Corporation. 2005a.
- URS Corporation. 2005b.
- Whetstone Associates, Inc. 2005.
- Bingham Environmental, 1995

4.4.3.1 Methods of Construction of Disposal Units

The Licensee's proposed methods for constructing and operating the CAC cell are unchanged from those already approved for the Class A and CAN embankments. Construction of the disposal unit will involve a continuous cut, backfill, and cover construction. To ensure that the CAC cell is built to design requirements, construction activities will be performed under the construction QA/QC program defined in and conform to the requirements of Revision 19h of the CQA/QC Manual (EnergySolutions, 2006b)

The primary activities involved in construction of the CAC cell include:

- Excavation
- Preparation of the disposal area foundation
- Construction of run-on and runoff protection
- Construction of liner
- Waste emplacement
- Backfill of external void spaces
- Construction of interim and final Cover over completed portions of disposal embankments
- Construction of permanent drainage ditches surrounding the disposal unit

The construction of these components is specified in the Licensee's CQA/QC Manual, Revision 19h (EnergySolutions, 2006b).

4.4.3.2 Waste Emplacement

Of particular interest is the placement of waste received and generated by site operations. The general procedures for waste emplacement and for CLSM Pyramid in the CAC cell are described in Sections 1.2, 2.2, and 3.2 of the CAC cell EJR. After the Liner has been constructed over a specific area of the CAC cell, at least 12 inches of debris-free soil will be placed on top of the CAC cell liner as a protection to the integrity of the Liner. Once this debris-free soil is in place, the area will be available for placement of waste containers and materials. Wastes will be placed in these open clay-lined areas as follows:

- Debris and large components will be disposed of in the Large Component Waste Placement Area (refer to Drawings 05054-C04, C05, and C06).
- Bulk waste will be disposed of in the remainder of the CAC cell.

Waste handling procedures are those identified in Appendices C, “Operating Procedures,” and M “Waste Characterization Plan,” of the 2005 LRA. Waste handling and interim storage will be managed in accordance with existing controls and at existing facilities provided by the existing radioactive materials license and the GWQDP, according to the waste type being managed. There will be no changes to these requirements for purposes of constructing the CAC cell

The Licensee will ensure that waste is properly identified, that the waste meets license limits for disposal, and consequently that LLRW, 11e.(2) waste, and Mixed Waste are neither co-located nor cross-contaminated. The Operations Procedures (2005 LRA Appendix C) related to waste handling and material segregation in the EnergySolutions Operating Procedures Manual also require that waste management and storage occur independently for each generator (with each waste stream being considered a different generator).

Oversized debris waste packages and/or pieces will be stacked in order to minimize the volume of void spaces between containers. Containers and large debris are placed to minimize the potential for entrapped air in each oversized debris lift. Associated container debris such as container lids or other incidental debris is placed so as to minimize potential entrapped air pockets. QC inspectors visually inspect the placed debris for compliance with the CQA/QC specifications. After acceptable quality control inspections, the lift will be backfilled by pouring CLSM over the waste.

Finally, any waste determined to be hazardous waste or that does not satisfy CAC cell waste characteristic requirements of the Radioactive Materials License or Groundwater Quality Discharge Permit will not be disposed of at the Licensee's CAC cell facility. Based on a review of the information summarized above, the Licensee has provided an adequate description of the procedures to be followed and areas to be used for waste segregation.

4.4.3.3 CAC Cell Intruder Barriers

Only Class A waste will be disposed of in the CAC cell. Since intruder barriers are required only for Class C waste under Utah regulations (R313-25-20), intruder barriers are not required as part of the design of the CAC cell. However, several design features (including the embankment cover system, CLSM, waste form, and the buffer zone) have the effect of protecting inadvertent intruder from exposure to the disposed materials and the effects of radiation.

4.4.3.4 Onsite Traffic and Drainage Systems

Drawing 04080-U01 presents the layout of the entire the Licensee site. Onsite earth-roadways are continuously changing to meet the demands of current disposal needs. As the height of an active disposal cell increases, as the activity in a portion of the embankment decreases, or as the activity for a new portion of the embankment increases, access roads are constructed or removed to facilitate safe hauling and disposal of materials. Roadways are constructed to ensure that water properly drains off from them, thus minimizing ponding or ponded road conditions. Haul roads

to disposal units generally are sloped at no greater than 3:1 in accordance with safety guidelines adhered to by the site's prime contractor.

Asphalt is generally used to construct onsite roadways. In addition, natural soils are also used and are graded and continuously compacted by frequent use and application of water for dust suppression. For final cover conditions at the site, inspection roads are tied into the drainage ditches' final rock cover. For waste disposal and final cover activities, the prime contractor is required to use haul trucks that are capable of climbing the 20-percent slope of the embankment.

The Licensee describes the onsite drainage systems in Sections 1.4, 2.4 and 3.4 of the CAC cell EJR. The Licensee has developed a berm system to direct water flow from precipitation, winter runoff, or other precipitation occurrences away from the site and stored materials. It also has developed an embankment drainage system surrounding each embankment to help minimize any water accumulation. The drainage systems are constructed of an erosion barrier rock of the same type used to cover the embankments. The design of the berms is sufficient to withstand the PMF without overtopping. The ditches will have triangular cross sections with side slopes of 1:5, and will have gentle longitudinal slopes, with depths great enough to carry the runoff from the 100-year, 1-hour storm event without exceeding their bounds. The drainage system plan is found in Drawing 05054-C01 and cross section and details of the drainage ditch is located in Drawing 05054-C03.

4.4.3.5 CAC Cell Survey Control Program

The survey control program proposed for the CAC cell is identical to that approved for use with the Class A and CAN cells except for minor variations in the survey control points. Survey control points for monitoring stations is depicted in Drawing 05054-U02 and control points for site boundaries, ditch locations, and final berm configurations is depicted in Drawing 05054-C01.

4.4.3.6 CAC Cell Methods and Areas of Waste Storage

The Licensee has addressed waste handling and interim storage of bulk and containerized LLRW in Section 4.2 of the 2005 LRA. Operating Procedures that address waste handling and interim storage are listed in Section 4.2 and included in Appendix C to the 2005 LRA.

4.4.3.7 Methods to Control Surface & Ground Water Access to the Wastes

The Licensee's plans for controlling the access of surface water to the LLRW are presented in Sections 1.4, 2.4, and 3.4 of the CAC cell EJR.

For groundwater, the minimum vertical separation between the bottom of the disposed LLRW and the historic high water table is determined as being 13 feet. This value is based on the groundwater contour map dated June 9, 2004 (Envirocare of Utah, Inc. to Utah Division of Radiation Control. 2004), and the June 1999 through December 2003 contour maps provided in the Revised Hydrogeologic Report (Envirocare 2004a), the minimum depth from the base of the liner (4263 feet elevation) to the groundwater below the proposed liner for the CAC cell over the past five years is approximately 13 feet (4250 feet elevation).

Based on the information summarized above, the Division has concluded that the Licensee has adequately described its proposed methods for constructing and operating the CAC cell.

4.4.4 Description of Site Closure Plan

Requirement 2507-7: [URCR R313-25-7(7)]

Basis: The Licensee's proposed site closure plan including closure of the proposed CAC cell are unchanged from those already approved for the Class A and CAN embankments. Before the final portion of the CAC cell is closed, all onsite facilities will be decommissioned. Decommissioning may involve any of the following activities:

- Decontamination prior to release as necessary
- Demolition
- Disposal onsite
- Release for unrestricted use
- Restoration to required final condition

Once all decommissioning waste requiring onsite disposal has been placed in the CAC cell, the interim cover is placed on the final portion of the CAC cell.

The CAC cell is progressively closed, as was the LARW embankment, as waste placement in portions of the embankment is completed. An interim cover system is first applied, settlement monitors will be placed, and allowed to stabilize, settle, and consolidate. Once the interim cover has been demonstrated to be stable within acceptable limits, the final cover system will be constructed.

The design and construction of the CAC cell facilitate disposal site closure and to eliminate the need for active maintenance after closure. Principal design features and their characteristics were chosen with the end point that the facility (and its components) must perform (as regards stability and limits on environmental releases) as required without the assistance or intervention of any individual or organization following closure.

The information contained in documents the Licensee has submitted (Energy Solutions, 2006a) indicate that the requirements of URCR R313-25-7(7) have been met to the extent possible at the date issuance, even though closure is not yet being planned. A description of decontamination and decommissioning procedures are provided in Appendix U of the 2005 LRA.

The site closure plan, being identical to that previously approved for use in the Class A and CAN disposal embankments, is also acceptable for use in the CAC cell. Based on the information summarized above, the Division concludes that the Licensee's proposed CAC cell is acceptable.

References:

- AMEC Earth & Environmental, Inc. 2005a.
- Energy Solutions, 2006a
- Envirocare of Utah, LLC. 2004a.
- Envirocare of Utah, LLC. 2004b.
- Envirocare of Utah, LLC. 2005a.
- Envirocare of Utah, Inc. to Utah Division of Radiation Control. 2004.
- URS Corporation. 2005a.
- URS Corporation. 2005b.
- Whetstone Associates, Inc. 2005.

4.4.5 Natural Resources

Requirement 2507-8: [URCR R313-25-7(8)]

Basis: The Division has identified a condition existing in land areas adjacent to the EnergySolutions facility in adjacent Sections 5 and 29, where Tooele County has rezoned to allow land use for mining, quarry, and sand and gravel extraction (Zone ME-GX). This condition involves the excavation of clay and other native soil materials for use in constructing disposal embankment components in Section 32 where the EnergySolutions facilities are located. The Division has inquired whether these excavation activities might have the potential of compromising the long-term stability of disposal cells or the ability of the facility to meet applicable groundwater protection levels. The Division is presently examining these conditions and will resolve their uncertainties as part of its review and evaluation of EnergySolutions' License Renewal Application.

CAC cell References:

- Envirocare of Utah, LLC. 2005a.
- URS Corporation. 2005a.
- URS Corporation. 2005b.

4.4.6 Classification and Specifications

Requirement 2507-9: [URCR R313-25-7(9)]

Basis: The waste streams proposed for the CAC cell are radiologically identical to those approved for disposal in the Class A and CAN embankments. Based on the information summarized above, the Division concludes that the Licensee's descriptions of the wastes for the proposed CAC cell are acceptable.

References:

- EnergySolutions, LLC. 2006a.
- Envirocare of Utah, Inc. 2004b.
- Envirocare of Utah, LLC. 2005a.
- Envirocare of Utah, LLC. 2005b.
- Envirocare of Utah, LLC. 2005c.
- URS Corporation. 2005a.
- URS Corporation. 2005b.

4.4.7 Quality Assurance Programs

Requirement 2507-10: [URCR R313-25-7(10)]

Basis: The information contained in the CAC cell AR and other relevant documents (engineering reports, supplemental data submissions and interrogatory responses) the Licensee has submitted indicate that the requirements of URCR R313-25-7(10) have been met.

The Licensee states in the EJR that the Quality Assurance plans and procedures as a whole are largely unaffected by the permitting of the CAC cell (EnergySolutions 2006a, Introduction) and refers to the quality assurance documents submitted with the 2005 LRA (Envirocare of Utah LLC 2005b).

The Quality Assurance Manual (QAM) in the 2005 LRA document provides a general description of the QA program. Although the Quality Assurance Program (QAP) document does not reference specific QA and implementing procedures tailored to LLRW disposal, Section 9.0 of the CAC cell AR discusses the CQA/QC Manual. These documents are tailored to a LLRW disposal facility. In addition, the operating procedures in the referenced 2005 LRA supplement the general requirements of the QAP.

The quality assurance plan and procedures proposed for the CAC cell are identical to that approved for the Class A and CAN embankments (URS Corporation 2005a; 2005b).

Based on the information summarized above, the Division concludes that the Licensee's proposed CAC cell quality assurance plans and procedures are acceptable.

References:

- EnergySolutions, LLC. 2006a.
- Envirocare of Utah, LLC. 2005a.
- Envirocare of Utah, LLC. 2005b.
- URS Corporation. 2005a.
- URS Corporation. 2005b.

4.4.8 Radiation Safety Program

Requirement 2507-11 [URCR R313-25-7(11)]

Basis: The information contained in the CAC cell AR and other relevant documents (engineering reports, supplemental data submissions and interrogatory responses) the Licensee has submitted indicate that the requirements of URCR R313-25-7(11) have been met.

The Licensee states in the EJR that the radiation safety implementing procedures and plans as a whole are largely unaffected by the permitting of the CAC cell (EnergySolutions 2006a, Introduction) and refers to the radiation safety documents submitted with the 2005 LRA in Appendix Q (Envirocare of Utah LLC 2005b). Occupational radiation exposures are governed through the Radiation Protection Program and the Licensee's management policy is included in the ALARA Program document. The documents are in Appendix H of the 2005 LRA.

The radiation safety plan and procedures proposed for the CAC cell are identical to that approved for the Class A and CAN embankments (URS Corporation 2005a; 2005b).

Based on the information summarized above, the Division concludes that the Licensee's proposed CAC cell radiation safety plans and procedures are acceptable.

References:

- EnergySolutions, LLC. 2006a.
- Envirocare of Utah, LLC. 2005a.
- Envirocare of Utah, LLC. 2005b.
- URS Corporation. 2005a.
- URS Corporation. 2005b.

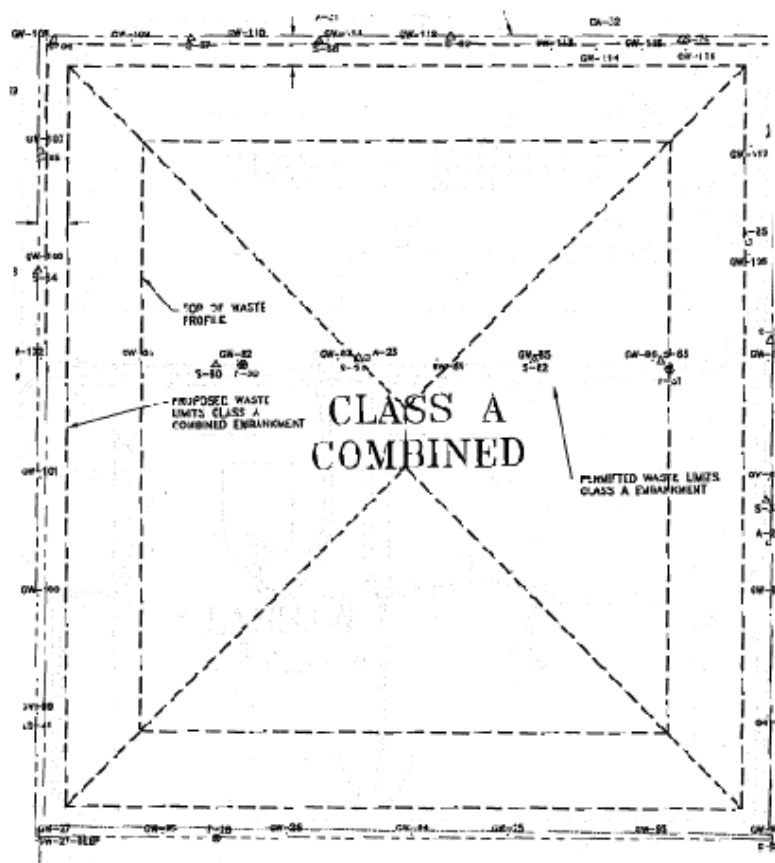
4.4.9 Environmental Monitoring Program

Requirement 2507-12 [URCR R313-25-7(12)]

Basis: The information contained in the CAC cell AR and other relevant documents (engineering reports, supplemental data submissions and interrogatory responses) the Licensee has submitted indicate that the requirements of URCR R313-25-7(12) have been met.

The Licensee states in the EJR that the monitoring network fits within the buffer zone, contaminants would not reach the monitoring wells for at least 500 years (EnergySolutions 2006a Section 3.5.1). Also, the majority of plans and procedures as a whole are largely unaffected by the permitting of the CAC cell (EnergySolutions 2006a, Introduction) and refers to the documents submitted with the 2005 LRA (Envirocare of Utah LLC 2005b). Construction of the CAC cell will remove some monitoring locations as they fall within the footprint of the Class A and CAN cells (EnergySolutions 2006a, Figure 05054 U02). An excerpt of Figure 05054 U202 is shown in Figure 4.

Figure 4. Environmental Monitoring and Sampling Locations for CAC cell



Locations to be abandoned or relocated are shown in Table 10.

Table 10. Environmental Monitoring Stations to be Abandoned/Relocated

Type	Location	Northing	Easting	Action
Air Monitoring Station	A-23	13728.22	11366.79	Removed – inside footprint
	A-25	14073.00	12631.00	Relocated east
Groundwater Monitoring Wells	GW-81	13737.22	10608.37	Removed – inside footprint
	GW-82	13731.35	10939.07	Removed – inside footprint
	GW-83	13724.95	11268.80	Removed – inside footprint
	GW-84	13718.82	11601.34	Removed – inside footprint
	GW-85	13712.21	11925.03	Removed – inside footprint
	GW-86	13703.91	12321.52	Removed – inside footprint
Soil Monitoring Station	S-60	13713.79	10862.88	Removed – inside footprint
	S-61	13726.91	11339.18	Removed – inside footprint
	S-62	13712.21	11925.03	Removed – inside footprint
	S-63	13702.41	12349.74	Removed – inside footprint
Fence E-perms	F-30	13713.31	10951.89	Removed – inside footprint
	F-31	13675.39	12375.77	Removed – inside footprint

The environmental monitoring plan will require modification to remove the above locations that would otherwise be inside the footprint of the proposed CAC cell. No changes to the analytical suites, matrices, or sampling/monitoring frequency are required or anticipated.

Based on the information summarized above, the Division concludes that the Licensee's proposed CAC cell environmental monitoring plans and procedures are acceptable.

References:

- EnergySolutions, LLC. 2006a.
- EnergySolutions, LLC. 2006c.
- Envirocare of Utah, LLC. 2005a.
- URS Corporation. 2005a.
- URS Corporation. 2005b.

4.4.10 Administrative Procedures

Requirement 2507-13 [URCR R313-25-7(13)]

Basis: The information contained in the CAC cell AR and other relevant documents (engineering reports, supplemental data submissions and interrogatory responses) the Licensee has submitted indicate that the requirements of URCR R313-25-7(13) have been met.

The Licensee states in the EJR that the administrative procedures and plans as a whole are largely unaffected by the permitting of the CAC cell (EnergySolutions 2006a, Introduction) and refers to the documents submitted with the 2005 LRA (Envirocare of Utah LLC 2005b).

The administrative procedures and plans proposed for the CAC cell are identical to that approved for the Class A and CAN embankments (URS Corporation 2005a; 2005b).

Based on the information summarized above, the Division concludes that the Licensee's proposed CAC cell administrative plans and procedures are acceptable.

References:

- EnergySolutions, LLC. 2006a.
- Envirocare of Utah, LLC. 2005a.
- Envirocare of Utah, LLC. 2005b.
- URS Corporation. 2005a.
- URS Corporation. 2005b.

4.4.11 Electronic Recordkeeping System

Requirement 2507-14: [URCR R313-25-7(14)]

Basis: The information contained in the CAC cell AR and other relevant documents (engineering reports, supplemental data submissions and interrogatory responses) the Licensee has submitted indicate that the requirements of URCR R313-25-7(14) have been met.

The Licensee states in the EJR that the electronic recordkeeping system is largely unaffected by the permitting of the CAC cell (EnergySolutions 2006a, Introduction) and refers to the documents submitted with the 2005 LRA (Envirocare of Utah LLC 2005b).

The electronic recordkeeping system proposed for the CAC cell is identical to that approved for the Class A and CAN embankments (URS Corporation 2005a; 2005b).

Based on the information summarized above, the Division concludes that the Licensee's proposed CAC cell electronic recordkeeping system is acceptable.

References:

- EnergySolutions, LLC. 2006a.
- Envirocare of Utah, LLC. 2005a.
- Envirocare of Utah, LLC. 2005b.
- URS Corporation. 2005a.
- URS Corporation. 2005b.

4.5R313-25-8; TECHNICAL ANALYSIS

4.5.1 General Population Protection

Requirement 2508-1: [URCR R313-25-8(1)]

Basis: The CAC cell analyses demonstrating protection of the general population are identical to those approved for the Class A and CAN embankments. The analyses for the CAN embankment refer to the 2005 LRA, Appendix A. Appendix A is the dose analysis during facility operations and it demonstrates that the doses are within the regulatory limit of 25 mrem/yr. The highest dose is about 10 mrem/yr. Doses after facility closure are referenced to the 2003 LRA, Appendix T, which shows all doses are below the 25 mrem/yr regulatory limit. The conditions upon which the analyses are based are the same as those for the CAC cell facility. Although the CAC cell is larger than the CAN embankment, the analyses for protection of the general population are the same. The doses to the general population depend on the radionuclide concentrations in the waste and not on the total volume of waste disposed. The analyses are applicable to the CAC cell and demonstrate that it will perform in the same way as the CAN embankment and the Class A embankment evaluated in the 2003 LRA.

The Licensee provided groundwater modeling of the CAC cell. The modeling evaluated water infiltration and radionuclide transport from the CAC cell to groundwater compliance wells (Whetstone 2006a, 2006b). Groundwater concentrations of radionuclides were calculated at the compliance monitoring well for a period of approximately 2,000 years. The modeling demonstrated that the State groundwater protection levels would be satisfied for all radionuclides for at least 500 years following closure. Compliance with the groundwater protection levels also ensures that the dose from groundwater will not exceed 4 mrem/yr.

The analyses consider exposures through air, soil, groundwater, surface water, plant uptake, and exhumation by burrowing animals and are summarized below.

Based on the information above, the Division concludes that the Licensee's proposed CAC cell is protective of the general population.

References:

- Envirocare of Utah, Inc. 2003.
- Envirocare of Utah, Inc. 2004b.
- Envirocare of Utah, LLC. 2005a.
- Envirocare of Utah, LLC. 2005b.
- URS Corporation. 2005a.
- URS Corporation. 2005b.
- Whetstone Associates, Inc. 2006a.
- Whetstone Associates, Inc. 2006b.

4.5.1.1 Air Pathway

Projected annual dose rates via the air pathway under normal operations and accident conditions are identical to those that the Division has already reviewed and approved in connection with the operation of the Class A and CAN cells. These projected air pathway doses are well within regulatory limits for both normal operations and accident conditions.

Based on the information above, the Division concludes that the Licensee's consideration of the air pathway is adequate.

4.5.1.2 Soil Pathway

Soil pathway doses involve exposure of the public to contaminated soil from the facility. If an exposure occurred, doses could result from external radiation or ingestion of soil on dirty hands. Direct radiation from soil is addressed in Section 6.4.1.1.5 in the 2005 LRA. External radiation levels at the top of the final cover will be at or below background radiation for the site, so no doses are anticipated. During operation, the facility will be monitored as described in 2005 LRA Appendix R, "Environmental Monitoring Plan" to ensure that releases or doses that occur via the soil pathway will be remain less than regulatory limits.

Based on the information above, the Division concludes that the Licensee's consideration of the soil pathway is adequate.

4.5.1.3 Groundwater Pathway

The Licensee has submitted detailed analyses of releases to the groundwater pathway from the proposed CAC cell and demonstrated (Whetstone, 2006b) to the Division's satisfaction that projected concentrations in groundwater and resulting dose rates will remain within acceptable

regulatory limits conditioned upon imposition of certain operational limitations. Those operational limitations are restated in Table 11 below:

Table 11. Maximum Allowable Cumulative Activity¹ by Radionuclide

Radionuclide	Class A Combined Cell (picocuries per gram)	Mixed Waste Cell (picocuries per gram)
Berkelium-247	1.036E-4	3.14E-3
Calcium-41	1.586E+0	NA
Chlorine-36	3.158E-1	8.75E+0
Iodine-129	1.219E+3	NA
Renium-187	8.240E+2	NA
Strontium-90	4.086E+3	NA
Technitium-99	2.113E+3	NA

Footnote for table defining maximum allowable cumulative activity by radionuclide:

1. The maximum allowable cumulative activity of any radionuclide shall be calculated by dividing the total activity of radionuclide received (picocuries) by the sum of the mass of the active cell (grams) and the mass of cells completed to date (grams)

Computer modeling of the groundwater pathway has shown that the groundwater protection criteria are satisfied for all radionuclides for at least 500 years, provided that concentration limits in the in-place waste shown in Table 11 are satisfied (Whetstone 2006b). These determinations were based on the assumption that the groundwater potentially contaminated by releases from the proposed CAC cell is actually potable. The natural high total dissolved solids content of the water (>20,000 mg/L) makes this assumption both unrealistic and conservative.

Based on the information above, the Division concludes that the Licensee's consideration of the groundwater pathway is adequate.

4.5.1.4 Surface Water Pathway

Surface water is addressed in the CAC cell AR by referring to Sections 6.4.1.1.3 and 6.4.2.1.3 of the 2005 LRA. Statements made for the Class A embankment are also applicable to the CAC cell. Surface water pathway doses are expected to be zero because of the absence of permanent surface water bodies at or near the site. The nearest stream channel is about two miles east of the facility. Surface water from precipitation (runoff) is directed away from the waste by the disposal embankment cover system and by drainage ditches and berms.

Based on the information above, the Division concludes that the Licensee's consideration of the surface water pathway is adequate.

4.5.1.5 Vegetation

The plant pathway is not expected to cause any doses to humans. The CAC cell AR addresses this pathway by reference to Sections 6.4.1.1.4 and 6.4.2.1.4 of the 2005 LRA. Statements made for the Class A embankment are also applicable to the CAC cell. Edible crops or animal forage are not expected to grow on the waste embankment due in part to elevated salinity in soils at the site. During operations all plants will be prevented from contacting the waste. After closure, the site's low precipitation and rip-rap cover will prevent crop production or growth of animal forage on the embankment. With respect to plant intrusion, the CAC cell should perform identically to the Class A or CAN embankments previously approved.

Based on the information above, the Division concludes that the Licensee's consideration of the vegetation pathway is adequate.

4.5.1.6 Burrowing Animals Pathway

The burrowing animal pathway is not expected to cause any doses to humans. Burrowing animals at the site include jackrabbits, mice, foxes, and ants. None of these species typically burrow deep enough to penetrate through the cover system and disturb the waste materials. The riprap erosion barrier, upper Type A filter zone, and sacrificial soil constitute the primary barriers against burrowing animals reaching the waste. The CAC cell AR addresses burrowing animals by reference to the CAN AR, the 2005 LRA, and the 2003 LRA. Burrowing animals are discussed along with plant intrusion in Sections 6.4.1.1.4 and 6.4.2.1.4 of the 2005 LRA. With respect to burrowing animals, the CAC cell should perform identically to the Class A or CAN embankments previously approved.

Based on the information above, the Division concludes that the Licensee's consideration of the burrowing animal pathway is adequate.

4.5.1.7 Doses to the Public

The information contained in the CAC cell AR and other relevant documents submitted by the Licensee indicate that the requirements of URCR R313-25-8(1) will be met and that the exposures to humans will not exceed the limits set forth in R313-25-19. These documents present the results of extensive analyses addressing the potential radionuclide releases to media including groundwater, surface water, air, soil, plants and animals, and discuss potential exposure pathways resulting from these releases. The analyses consider both normal conditions and unusual or accident conditions. Radionuclide transport from disposed wastes was evaluated. The annual doses resulting from the potential releases were found to be within the regulatory limit of 25 mrem to the whole body, 75 mrem to the thyroid, and 25 mrem to any other organ.

In addition to meeting the regulatory dose limits, the Licensee has committed to conduct operations in a manner that keeps exposures and doses as low as reasonably achievable (ALARA). The Licensee's ALARA Program is defined in Appendix H of the 2005 LRA.

As shown in Section 5.1 of this SER, the groundwater quality protection standards stated in R317.6-6.3 are satisfied by proposals of the CAC cell AR.

Based on the information summarized above, the Division concludes that the Licensee's proposed CAC cell protects the general population and meets all regulatory dose requirements.

References:

- Envirocare of Utah, Inc. 2004b.
- Envirocare of Utah, LLC. 2005a.
- Envirocare of Utah, LLC. 2005b.
- URS Corporation. 2005a.
- URS Corporation. 2005b.
- Whetstone Associates, Inc. 2006a.
- Whetstone Associates, Inc. 2006b.

4.5.2 Protection of Inadvertent Intruders

Requirement 2508-2 [URCR R313-25-8(2)]

Basis: Utah regulations require an intruder barrier only for the disposal of Class C LLRW. Since only Class A waste will be disposed of in the proposed CAC cell, no intruder barrier, as defined by Utah regulations, is required. In a more general sense, however, intruder protection is required by the performance objective stated in URCR R313-25-20. The intruder protection requirement is satisfied by:

- Remoteness of the facility from large population centers
- Cover system provided to separate the waste from the atmosphere
- Use of CLSM
- Physical access barriers erected and maintained at the closed facility
- Access controls maintained at the closed facility
- Monuments placed denoting the locations embankment boundaries.

The Licensee considered intrusion scenarios in Sections 6.4.1.3 and 6.4.2.3 of the 2005 LRA. The Licensee evaluated the potential for inadvertent intrusion into the embankment and concluded that the intruder constructor and intruder agriculture scenarios were not reasonable. An intruder explorer would receive an insignificant dose. Conclusions are based upon the poor water quality, arid conditions and institutional controls.

The NRC evaluated the long-term hazards of LLRW disposal in its draft and final environmental impact statements of the regulation of LLRW disposal (NUREG/CR-4370). Radiation hazards associated with Class A waste are such that, should intrusion into disposed waste occur following the 100-year institutional control period, doses were projected to be less 500 mrem.

Based on the provisions of URCR R313-15 and R313-25, inadvertent intruder barriers are not required for Class A LLRW. Since the Licensee will dispose only Class A LLRW, it implicitly complies with this regulatory requirement.

Based on the information summarized above, the Division concludes that the Licensee's proposed CAC cell provides adequate intruder protection.

Based on the provisions of URCR R313-15 and R313-25, inadvertent intruder barriers are not required for Class A LLRW. Since the Licensee will dispose only Class A LLRW, it implicitly complies with this regulatory requirement.

Based on the information summarized above, the Division concludes that the Licensee's proposed CAC cell provides adequate intruder protection.

References:

- Envirocare of Utah, Inc. 2004b.
- Envirocare of Utah, LLC. 2005a.
- Envirocare of Utah, LLC. 2005b.
- Oztunali, O. I., and G. W. Roles. 1986.
- URS Corporation. 2005a.
- URS Corporation. 2005b.
- Whetstone Associates, Inc. 2006a.
- Whetstone Associates, Inc. 2006b.

4.5.3 Exposure Assessment

Requirement 2508-3 [URCR R313-25-8(3)]

Basis: The exposure assessment for the CAC cell is identical to that approved for the Class A and CAN embankments. The conditions upon which the exposure assessment is based are the same as conditions expected at the CAC cell.

The 2005 LRA presents the results of extensive analyses of potential radionuclide releases to media including groundwater, surface water, air, soil, plants, and animals. Exposures and doses to individuals through each of these media are discussed. The analyses consider normal operations, unusual conditions, and accidents. Radionuclide transport from disposed waste was evaluated. The annual doses resulting from the potential releases were found to be within the regulatory limit of 25 mrem to the whole body, 75 mrem to the thyroid, and 25 mrem to any other organ.

Doses during normal operations are presented in Appendix A of the 2005 LRA. Doses after facility closure from the groundwater pathway are evaluated in the infiltration and transport modeling report (Whetstone 2006b). The groundwater concentrations all satisfy the State groundwater protection levels, which are based on a maximum dose of 4 mrem/yr. Doses from

accidents are presented in Section 6.3.2 of the 2005 LRA. None of the accident doses exceed 1 mrem and the maximum organ doses are all below 10 mrem.

In addition to meeting the regulatory dose limits, the Licensee has committed to conduct operations in a manner that keeps exposures and doses as low as reasonably achievable (ALARA). The Licensee's ALARA Program is defined in Appendix H of the 2005 LRA.

Based on the information summarized above, the Division concludes that the Licensee's exposure assessment for the proposed CAC cell is acceptable.

References:

- Envirocare of Utah, LLC. 2005a.
- Envirocare of Utah, LLC. 2005b.
- URS Corporation. 2005a.
- URS Corporation. 2005b.
- Whetstone Associates, Inc. 2006a.
- Whetstone Associates, Inc. 2006b.

4.5.4 Long-Term Stability of Disposal Site

Requirement 2508-4: [URCR R313-25-8(4)]

Basis: The long-term stability of the proposed CAC cell is identical to that already approved for the Class A and Class A North cells. For additional information on long-term embankment stability, refer to Section 4.4.5 of this SER>

The analyses of the proposed CAC cell indicate to the Division's satisfaction that long-term stability of the cell will be achieved with reasonable assurance. Based on the information summarized above, the Division concludes that the Licensee's proposed CAC cell long-term stability is acceptable.

References:

- Envirocare of Utah, LLC. 2004b.
- Envirocare of Utah, LLC. 2005a.
- Envirocare of Utah, LLC. 2005b.
- URS Corporation. 2005a.
- URS Corporation. 2005b.
- Whetstone Associates, Inc. 2005.

4.6R313-25-10; FINANCIAL QUALIFICATIONS TO CARRY OUT ACTIVITIES

Requirement 2510-1 and Requirement 2511-9 [URCR R313-25-11(1 and -11(9))]

Basis: The information contained in the Licensee's documents indicate, to the Division's satisfaction, that the requirements of URCR R313-25-10(1) , 25-11(9) , and 25-30(1) have been or will be met. The Division has reviewed the information and determined that the information contained a reasonable estimate of the cost to develop, operate, close, monitor, and maintain the facility as required by R313-25, as demonstrated by information submitted in support of License Amendment 22B issued on March 2, 2006.

Based on the information summarized above, the Division concludes that the Licensee is financially qualified to carry out the activities for which the CAC cell license amendment is sought.

References:

- Envirocare of Utah, LLC. 2004b.
- Envirocare of Utah, LLC. 2005a.
- Envirocare of Utah, LLC. 2005b.
- URS Corporation. 2005a.
- URS Corporation. 2005b.
- UDRC 2006

4.7R313-25-18; INDIVIDUAL EXPOSURE ASSURANCE

Requirement 2518-1: [URCR R313-25-18(1)]

Basis: Refer to Section 4.5, "R313-25-8; Technical Analysis."

4.8R313-25-19; PROTECTION OF THE GENERAL POPULATION FROM RELEASES OF RADIOACTIVITY

Requirement 2519-1: [URCR R313-25-20]

Basis: The exposure assessment presented by the Licensee forms the basis for demonstrating protection of the general population. Section 4.5.1 of this SER summarizes the environmental pathways through which members of the general population may be exposed. The potential doses to the population were shown to be within regulatory limits. Section 4.5.3 of this SER discusses the exposure assessment for the CAC cell AR. Both the exposure assessment and the pathway dose calculations were found to be adequate and within regulatory dose limits.

Based on the information summarized above, and the findings in Sections 4.5.1 and 4.5.3 of this SER, the Division concludes that the general population is adequately protected from releases of radioactivity.

Refer to Section 4.5.1, “General Population Protection.”

4.9R313-25-20; PROTECTION OF INDIVIDUALS FROM INADVERTENT INTRUSION

Requirement 2520-1: [URCR R313-25-20]

Basis: Refer to Section 4.5.2 of this SER.

References:

- Envirocare of Utah, LLC. 2005a.

4.10 R313-25-21; PROTECTION OF INDIVIDUALS DURING OPERATION

Requirement 2521-1: [URCR R313-25-21]

Basis: Refer to Section 4.5.3, “Exposure Assessment.”

4.11 R313-25-22; STABILITY OF THE DISPOSAL SITE AFTER CLOSURE

Requirement 2522-1: [URCR R313-25-22]

Basis: Refer to Section 4.5.4 of this SER

Refer to Section, “Long-Term Stability of Disposal Site.”

4.12 R313-25-23; DISPOSAL SITE SUITABILITY REQUIREMENTS FOR LAND DISPOSAL NEAR-SURFACE DISPOSAL

4.12.1 Long-Term Performance

Requirement 2523-1 [URCR R313-25-23(1)]

Basis: The information contained in the 2005 LRA and other relevant documents (engineering reports, supplemental data submissions and interrogatory responses) the Licensee has submitted indicate that the requirements of URCR R313-25-23(1) have been met. The CAC cell AR and its references adequately demonstrate that the primary emphasis in disposal site suitability is given to isolation of wastes and to disposal site features that ensure that the long-term performance objectives are met. Bases for this affirmative finding are presented under Requirements R25-23-2 through R25-23-11 of this SER.

References:

- Envirocare of Utah, LLC. 2005a.
- Envirocare of Utah, LLC. 2005b.

4.12.2 Natural Resources

Requirement 2523-4: [URCR R313-25-23(4)]

Basis: Refer to Section 4.4.5 of this SER.

4.12.3 Site Well Drained and Free of Flooding or Ponding

Requirement 2523-5: [URCR R313-25-23(5)]

Basis: The information contained in the 2005 LRA and supporting documents the Licensee has submitted indicate that the requirements of URCR R313-25-23(5) have been met. Section 2.5 of the 2005 LRA discusses surface water hydrology of the site, stating that the site is located in the semi-arid desert of western Utah and that there are no surface-water bodies present at the site and the lack of surface water features within 5 miles. The nearest stream channel is two miles east of the site. The site proposed for the CAC cell is identical to that approved for the Class A and CAN embankments. The conditions upon which the surface water hydrology and drainage is based are similar.

Section 2.5 of the 2005 revision of the LRA provides detailed information to support the conclusion that the lack of surface water bodies, the sparse precipitation and the high evaporation rate make it unlikely that any condition creating a permanent body of standing water will occur. The embankments have been designed to divert any water that may flow toward the facility during flooding and to drain incident precipitation away from the embankment and any disposed waste. The design criteria, characteristics, performance criteria, and operational design and construction of the drainage systems designed to prevent ponding and flooding is provided in Sections 3.1.4, 3.2.4, 3.3.4, and 3.4.4, respectively, of the 2005 revision of the LRA. Requirement 2523-5 was found to be satisfied in the SERs for the Class A North Amendment and the 2005 LRA.

Based on the information summarized above, the Division concludes that the Licensee's proposed CAC cell site is acceptable.

References:

- Envirocare of Utah, LLC. 2005a.
- URS Corporation. 2005a.
- URS Corporation. 2005b.

4.12.4 Avoided Areas of Tectonic Processes

Requirement 2523-9 [URCR R313-25-23(9)]

Basis: The seismic characteristics of the previously approved and licensed site were reevaluated, to the satisfaction of the Division, as part of the CAC cell AR. Details can be found in AMEC 2005b and AMEC 2006. The revised seismic conditions were used in evaluations of stability and the site and its disposal embankments demonstrated, to the Division's satisfaction, to be stable.

Based on the information summarized above, the Division concludes that the Licensee's proposed CAC cell site is acceptable.

References:

- Envirocare of Utah, LLC. 2005a.
- URS Corporation. 2005a.
- URS Corporation. 2005b.
- AMEC 2005b.
- AMEC 2006.

4.12.5 Nearby Facilities or Activities

Requirement 2523-9 [URCR R313-25-23(11)]

Basis: Refer to Section 4.4.5 of this SER.

**4.13 R313-25-24; DISPOSAL SITE DESIGN FOR NEAR-SURFACE
LAND DISPOSAL**

4.13.1 Long-Term Isolation Without Active Maintenance

Requirement 2524-1 [URCR R313-25-24(1)]

Basis: The information contained in the CAC cell AR and other relevant documents (engineering reports, supplemental data submissions and interrogatory responses) the Licensee has submitted indicate that the requirements of URCR R313-25-24(1) have been met.

- The disposal site is located in an area with a precipitation rate smaller than 9 inches per year (Meteorological Solutions Inc. 2004.).
- The disposal site is located in an area where the concentration of total dissolved solids in groundwater is greater than 20,000 mg/L, making it unusable without extensive processing, thereby eliminating human exposure that might otherwise result from groundwater ingestion (Envirocare of Utah, LLC, 2004a).
- Waste is disposed of below ground and covered with no less than 8 feet of earthen cover materials (EnergySolutions, 2006a).
- Both vertical and horizontal groundwater velocities are slow.

- The final cover is not constructed until the embankment settlement has been demonstrated to be within acceptable limits through construction of an interim cover prior to construction of the final cover.
- Waste is disposed of no less than 13 feet above the historic high water table at the site.
- The cover system is designed to limit the potential for water erosion, wind erosion, plant intrusion, and animal intrusion (EnergySolutions, 2006a).
- The cover system is designed and constructed to limit radiation exposure rate at its top surface to less than 100 mrem/yr, as required by regulation (EnergySolutions, 2006a).
- The boundaries of the closed CAC cell will be marked with permanent monuments or markers that warn against intrusion.

The information provided by Licensee demonstrates that site characteristics provide confidence that the need for continuing active maintenance after site closure will be avoided. This information is the same as that provided and that the Division found acceptable in licensing LLRW disposal in the Class A and CAN cells. Bases for this affirmative finding are presented under Requirements 2508-01 through 2508-4 provided in Section 4.5 of this SER. Reference to Requirements 2507-2 through 2507-5 of this SER also demonstrate that the Principal Design Features have been designed to perform as intended for many years following the Institutional Control period without reliance on active ongoing maintenance.

References:

- EnergySolutions, LLC. 2006a.
- Envirocare of Utah, LLC. 2004.
- Meteorological Solutions Inc. 2004.

4.13.2 Design Compatible with Closure and Stabilization

Requirement 2524-2: [URCR R313-25-24(2)]

Basis: The information provided by Licensee demonstrates that site characteristics and operating procedures provide confidence that the proposed CAC cell design is compatible with closure and stabilization plans. This information is the same as that provided and that the Division found acceptable in licensing LLRW disposal in the Class A and CAN cells.

Based on the information summarized above, the Division concludes that the Licensee's proposed CAC cell is acceptable.

References:

- EnergySolutions, LLC. 2006a.
- Envirocare of Utah, LLC. 2005a.
- Envirocare of Utah, LLC. 2005b.

- URS Corporation. 2005a.
- URS Corporation. 2005b.

4.13.3 Complement and Improve the Disposal Site's Natural Characteristics

Requirement 2524-3: [URCR R313-25-24(3)]

Basis: Site characteristics that influence the extent to which radioactive material may be released to the general environment and potentially cause radiation exposure to members of the general public include:

- Precipitation rate
- Depth to groundwater
- Dissolved solids content of groundwater
- Probable maximum magnitude of flood events

Design, operating, and closure features provided that complement and improve the ability of the site to limit the release of radioactive material from the site and potentially cause radiation exposure to members of the general public include:

- Multi-layer engineered cover system
- Waste emplacement procedures and configurations that produce a stable disposal embankment
- Clay liner under disposed waste with permeability greater than that of the cover system
- Limited concentrations of radionuclides
- Final cover not constructed until settlement shown to be within acceptable limits

The site characteristics that influence the extent to which individuals may be exposed to radioactive releases during facility operations include:

- Sparse population density in vicinity of the disposal embankment
- Unstable or neutral atmospheric stability conditions prevail in winds at the site for more than 70 percent of the time (releases from the facility surface will not remain concentrated but will decrease as distance from the facility increases)

Design, operating, and closure features provided that complement and improve the ability of the site to limit the extent to which individuals may be exposed to radiation during facility operations include:

- Waste with highest radioactive concentrations and hazards are contained in shipping containers that are disposed of without opening them

- Waste handling and placement operations are conducted so as to limit the release of radioactive materials during operations

The site characteristics that influence the extent to which long-term stability of the disposal site is achieved and to which the need for ongoing active maintenance of the disposal site following closure is eliminated include:

- Precipitation rate is less than 9 inches per year
- Concentration of dissolved solids in groundwater is greater than 20,000 mg/L

Design, operating, and closure features provided that complement and improve the ability of the site to limit the extent to which long-term stability of the disposal site is achieved and to which the need for ongoing active maintenance of the disposal site following closure is eliminated include:

- The final cover is not constructed until the embankment settlement has been demonstrated to be within acceptable limits
- The cover system is designed to limit the potential for water erosion, wind erosion, plant intrusion, and animal intrusion
- Internal erosion between layers of the cover system is prevented by design and construction
- Cover system slopes are stable under static and dynamic conditions
- The permeability of the cover system is designed and constructed to be smaller than that of the liner system

Based on the information summarized above, the Division concludes that the Licensee's proposed CAC cell is acceptable.

References:

- EnergySolutions, LLC. 2006a.
- Envirocare of Utah, LLC. 2005a.
- Envirocare of Utah, LLC. 2005b.
- URS Corporation. 2005a.
- URS Corporation. 2005b.

4.13.4 Minimize Water Infiltration

Requirement 2524-4: [URCR R313-25-24(4)]

Basis: Refer to Section 4.4.2.3.3 of this SER

References:

4.13.5 Direct Surface Water Drainage Away from Disposal Units

Requirement 2524-5: [URCR R313-25-24(5)]

Basis: The information contained in the CAC cell AR the Licensee has submitted indicate, to the Division's satisfaction, that the requirements of URCR R313-25-24(5) have been or will be met. Details can be found in Section 4.4.2.4 of this SER.

References:

- AMEC Earth & Environmental, Inc. 2005a.
- Envirocare of Utah, LLC. 2004b.
- Envirocare of Utah, LLC. 2005a.
- Envirocare of Utah, LLC. 2005b.
- URS Corporation. 2005a.
- URS Corporation. 2005b.
- Whetstone Associates, Inc. 2005.

4.13.6 Minimize the Contact of Water with Waste

Requirement 2524-6: [URCR R313-25-24(6)]

Basis: As earlier approved for the Class A and Class A North disposal embankments, the Licensee proposes a number of measures to minimize the potential for water contacting waste during and following operations. The composition of the clay liner proposed for the CAC cell is identical to that already approved for the Class A and CAN cells. Operating procedures involving the active removal of water that accumulates on the clay liner also minimize the potential for contact between water and waste during operations. Based on the information summarized above, the Division concludes that the Licensee's proposed CAC cell is acceptable.

References:

- AMEC Earth & Environmental, Inc. 2005a.
- Envirocare of Utah, LLC. 2004b.
- Envirocare of Utah, LLC. 2005a.
- Envirocare of Utah, LLC. 2005b.
- URS Corporation. 2005a.
- URS Corporation. 2005b.
- Whetstone Associates, Inc. 2005.

4.14 R313-25-25; NEAR SURFACE LAND DISPOSAL FACILITY OPERATION AND DISPOSAL SITE CLOSURE

4.14.1 Class A Segregated from Other Classes of Waste

Requirement 2525-01: [URCR R313-25-25(1)]

Basis: Since only Class A LLRW is disposed of at the proposed CAC cell, the requirements to segregate unstable Class A LLRW from other classes of LLRW does not apply.

References:

- EnergySolutions, LLC. 2006a.
- Envirocare of Utah, LLC. 2005a.
- Envirocare of Utah, LLC. 2005b.
- URS Corporation. 2005a.
- URS Corporation. 2005b.

4.14.2 Class C Provided with Intruder Barriers

Requirement 2525-02: [URCR R313-25-25(2)]

Basis: The requirement to protect inadvertent intruders applies only to the disposal of Class C LLRW. Since only class A LLRW will be disposed of in the proposed CAC cell, this requirement does not apply to the CAC cell.

References:

- EnergySolutions, LLC. 2006a.
- Envirocare of Utah, LLC. 2005a.
- Envirocare of Utah, LLC. 2005b.
- URS Corporation. 2005a.
- URS Corporation. 2005b.

4.14.3 Only Class A, B and C are Suitable for Near-Surface Disposal

Requirement 2525-03: [URCR R313-25-25(3)]

Basis: This requirement is satisfied by the fact that only Class A LLRW will be disposed of in the proposed CAC cell.

References:

- EnergySolutions, LLC. 2006a.
- Envirocare of Utah, LLC. 2005a.

- Envirocare of Utah, LLC. 2005b.
- URS Corporation. 2005a.
- URS Corporation. 2005b.

4.14.4 Maintain Package Integrity and Minimize Void Space

Requirement 2525-04: [URCR R313-25-25(4)]

Basis: Waste handling, placement, and backfilling procedures and disposal configurations to be used in the CAC cell (that have a major role in preserving package integrity and minimizing void space) are identical to those already approved for the Class A and CAC cell. Therefore, the proposed operations for the CAC cell are acceptable.

References:

- EnergySolutions, LLC. 2006a.
- Envirocare of Utah, LLC. 2005a.
- Envirocare of Utah, LLC. 2005b.
- URS Corporation. 2005a.
- URS Corporation. 2005b.

4.14.5 Void Spaces Between Waste Packages Filled

Requirement 2525-05: [URCR R313-25-25(5)]

Basis: Based on the information summarized in Section 4.4.2.2.1 of this SER, the Division concludes that the Licensee's proposed CAC cell plans to fill void spaces between waste packages is acceptable.

References:

- EnergySolutions, LLC. 2006a.
- Envirocare of Utah, LLC. 2005a.
- Envirocare of Utah, LLC. 2005b.
- URS Corporation. 2005a.
- URS Corporation. 2005b.

4.14.6 Limits the Radiation Dose at the Surface of the Cover

Requirement 2525-06: [URCR R313-25-25(6)]

Basis: Values of all factors that affect the projected dose rate at the surface of the final cover system for the proposed CAC cell are either the same as or greater than (in the sense that projected dose will be smaller) those of the Class A and CAN embankments. Since these factors

were acceptable for the Class A and CAN embankments, they are also acceptable for the proposed CAC cell.

References:

- EnergySolutions, LLC. 2006a.
- Envirocare of Utah, LLC. 2005a.
- Envirocare of Utah, LLC. 2005b.
- URS Corporation. 2005a.
- URS Corporation. 2005b.

4.14.7 Boundaries and Locations of Disposal Units

Requirement 2525-07: [URCR R313-25-25(7)]

Basis: The information contained in the CAC cell AR and other relevant documents (engineering reports, supplemental data submissions and interrogatory responses) the Licensee has submitted indicate that the requirements of URCR R313-25-25(7) will be met. As is presented in Section 4.3.5 of the 2005 LRA, closed embankments will be marked in the same way as a closed uranium mill tailings cell. Permanent granite markers, similar to those placed at the Vitro embankment, will be placed at the closed embankment. Markers will consist of unpolished granite of specified minimum dimensions, inscribed with lettering of specified characteristics. The markers will be set in a bed of reinforced concrete and slightly raised from the ground/cover surface.

Markers will be placed at the entrance to the site and near the center of the crest of the completed embankment. They will identify the site; the general location of the disposed materials; dates of construction and closure; volume, mass, or tonnage of disposed material; kilograms of source material, grams of special nuclear material; and total activity of radioactive material disposed of in the embankment.

The proposed marking for the CAC cell is identical to that approved for the Class A and CAN embankments. Based on the information summarized above, the Division concludes that the Licensee's proposed marking for the CAC cell is acceptable.

References:

- Envirocare of Utah, LLC. 2005a.
- Envirocare of Utah, LLC. 2005b.

4.14.8 Buffer Zone

Requirement 2525-08: [URCR R313-25-25(8)]

Basis: The Buffer Zones proposed for the CAC cell are identical to those already approved for the Class A and CAN cells. The Division concludes that the proposed Buffer Zone dimensions are acceptable.

References:

- Envirocare of Utah, LLC. 2004b.
- Envirocare of Utah, LLC. 2005a.
- Envirocare of Utah, LLC. 2005b.
- URS Corporation. 2005a.
- URS Corporation. 2005b.
- Whetstone Associates, Inc. 2005.

4.14.9 Closure and Stabilization Measures Carried Out as the Disposal Units are Filled and Covered

Requirement 2525-09: [URCR R313-25-25(9)]

Basis: As described in Section 4.4.2.2 of this SER, waste is placed, voids backfilled in a progressive manner to allow closure of the CAC cell in the same manner as already approved for the Class A and CAN embankments. Based on the information summarized above, the Division concludes that the Licensee's proposed CAC cell closure and stabilization measures are acceptable.

References:

- EnergySolutions, LLC. 2006a.
- Envirocare of Utah, LLC. 2005a.
- Envirocare of Utah, LLC. 2005b.
- URS Corporation. 2005a.
- URS Corporation. 2005b.

4.14.10 Active Waste Disposal Operations Shall Not Adversely Affect Closed and Stabilized Areas

Requirement 2525-10: [URCR R313-25-25(10)]

Basis: As described in Sections 4.15.2 and 4.16.9 of this SER, the design and operations of the proposed CAC cell allow active waste disposal operations to continue without adversely affecting closed and stabilized areas. Based on the information summarized above, the Division concludes that the Licensee's proposed CAC cell active operations shall not adversely affect closed and stabilized areas, and the operations are acceptable.

References:

- EnergySolutions, LLC. 2006a.
- Envirocare of Utah, LLC. 2005a.
- Envirocare of Utah, LLC. 2005b.
- URS Corporation. 2005a.
- URS Corporation. 2005b.

4.14.11 Only Radioactive Waste is Acceptable

Requirement 2525-11: [URCR R313-25-25(11)]

Basis: The Licensee proposes to dispose of only Class A LLRW as required by Utah regulations. Approved for the Class A and CAN embankments. Thus, the Division concludes that the requirement to dispose of only radioactive waste is satisfied.

References:

- EnergySolutions, LLC. 2006a.
- Envirocare of Utah, LLC. 2005a.
- Envirocare of Utah, LLC. 2005b.
- URS Corporation. 2005a.
- URS Corporation. 2005b.

4.15 R313-25-26; ENVIRONMENTAL MONITORING

4.15.1 Operational Environmental Monitoring Program

Requirement 2526-2: [URCR R313-25-26(2)]

Basis: The information contained in the CAC cell AR and other relevant documents (engineering reports, supplemental data submissions and interrogatory responses) the Licensee has submitted indicate that the requirements of URCR R313-25-26(2) will be met. Since the Licensee has ongoing waste disposal operations at the site, the operational environmental monitoring program for those activities will be sufficient to constitute the future -operational environmental monitoring program for the subject facility. Attachment 2 to the CAN AR includes suggested revisions to the current environmental monitoring plan based on the addition of the proposed CAN facility, as does the draft submission in March 2006 (EnergySolutions 2006c). Section 4.9.2 in the 2005 LRA includes the current environmental monitoring plan (Plan) as Appendix R. Quarterly environmental monitoring reports have been developed by the Licensee following this Plan and submitted to the Division since 1999 to document and evaluate potential long-term effects and the need for mitigative measures. The Division has determined that the current Plan is capable of providing early warning of releases of waste from the disposal site before they leave the site boundary.

Refer to Section 4.4.9 of this SER, “Environmental Monitoring Program,” for a summary of proposed abandoned and relocated monitoring locations.

Based on the information summarized above, the Division concludes that the Licensee’s proposed CAC cell operational monitoring plan is acceptable.

References:

- EnergySolutions, LLC. 2006a.
- EnergySolutions, LLC. 2006c.
- Envirocare of Utah, LLC. 2005a.
- URS Corporation. 2005a.
- URS Corporation. 2005b.

4.15.2 Post-Operational Surveillance

Requirement 2526-3: [URCR R313-25-26(3)]

Basis: The proposed plan for post-operational surveillance of the proposed CAC cell is unchanged from that previously approved for the Class A and CAN cells. Therefore, the Division approves these plans for the post-operational surveillance of the proposed CAC cell.

References:

- EnergySolutions, LLC. 2006a.
- EnergySolutions, LLC. 2006c.
- Envirocare of Utah, LLC. 2005a.
- URS Corporation. 2005a.
- URS Corporation. 2005b.

4.15.3 Corrective Measures

Requirement 2526-4: [URCR R313-25-26(4)]

Basis: The Division has accepted EnergySolutions repeated commitments in previously submitted license renewal applications and license amendment request to “take any necessary protective and restorative actions should environmental monitoring identify unplanned or excessive releases of contaminants”. These commitments apply to the operation, closure, and post-closure monitoring of the Class A, CAN, and proposed CAC cells and are acceptable to the Division.

References:

- Envirocare of Utah, Inc. 1998
- Envirocare of Utah, Inc. 2000

- Envirocare of Utah, Inc. 2005a
- EnergySolutions, LLC. 2006a.
- EnergySolutions, LLC. 2006c.
- Envirocare of Utah, LLC. 2005a.
- URS Corporation. 2005a.
- URS Corporation. 2005b.

4.16 R313-25-30; LICENSEE QUALIFICATIONS AND ASSURANCES

Requirement 2530-1 [URCR R313-25-30(1)]

Basis: The Licensee has shown through information provided in confidential communications that it either possesses the necessary funds, or has reasonable assurance of obtaining the necessary funds, or by a combination of the two, to cover the estimated costs of conducting all licensed activities over the planned operating life of the project, including costs of construction and disposal.

Based on the information summarized above, the Division concludes that the Licensee is financially qualified to perform all activities the CAC cell AR would authorize them to perform.

References:

- EnergySolutions, LLC. 2006a.
- Envirocare of Utah, LLC. 2005a.
- Envirocare of Utah, LLC. 2005b.
- URS Corporation. 2005a.
- URS Corporation. 2005b.

4.17 R313-25-32; FINANCIAL ASSURANCES FOR SITE CLOSURE AND STABILIZATION

Requirement 2531-1: [URCR R313-25-31(1)]

Basis: Under License Condition 73, EnergySolutions is required to submit a surety evaluation report by August 31 of each year. The latest such report was submitted on August 31, 2005 and included a cost estimate for activities associated with the facility closure and stabilization using an independent contractor. The Division approved this surety report on April 24, 2006.

In addition, the CAC cell was evaluated to determine its effect on the surety approved in April 24, 2006. EnergySolutions submitted its evaluation on August 23, 2006. The Division reviewed and accepted its methods and conclusions and the surety was approved on August 30, 2006.

Based on the information summarized above, the Division concludes that the Licensee has provided financial assurances sufficient to satisfy the requirements of URCR R313-25-31(1).

References:

- EnergySolutions. 2006c.
- Utah Division of Radiation Control. 2006a.

4.18 R313-25-32; FINANCIAL ASSURANCES FOR INSTITUTIONAL CONTROL

Requirement 2532-2: [URCR R313-25-32(2)]

Basis: Under License Condition 73, EnergySolutions is required to submit a surety evaluation report by August 31 of each year. The latest such report was submitted on August 31, 2005 and included an annual cost estimate for conducting the institutional control program at the closed facility. The Division approved this surety report on April 24, 2006.

Based on the information summarized above, the Division concludes that the Licensee has provided financial assurances sufficient to satisfy the requirements of URCR R313-25-31(1).

References:

- AMEC Earth & Environmental, Inc. 2005a.
- Envirocare of Utah, LLC. 2004b.
- Envirocare of Utah, LLC. 2005a.
- Envirocare of Utah, LLC. 2005b.
- URS Corporation. 2005a.
- URS Corporation. 2005b.
- Whetstone Associates, Inc. 2005.

5.0 GROUNDWATER QUALITY DISCHARGE PERMIT REQUIREMENTS

The Division has determined that the request to amend both the radioactive materials license and the groundwater quality discharge permit to allow construction and operation of the proposed CAC cell constitutes a request to construct and operate a new facility. With this determination, the requirements of UAC R317-6-6.4(A) apply and must be satisfied.

5.1 GROUNDWATER QUALITY PROTECTION AND PERMIT LIMITS

Requirement GWDP-664-1: [UAC R317-6-6.4(A)(1)]

1. The Permittee demonstrates that the applicable class TDS limits, ground water quality standards protection levels, and permit limits established under R317-6-6.4(A)(1) will be met;

Basis: The groundwater at the South Clive site naturally contains total dissolved solids in excess of 20,000 mg/L. Such concentrations cause the groundwater at the site to be Class IV groundwater. Even though ground water quality standards protection levels are not explicitly stated for Class IV groundwater, Utah rules require that they will be established to protect human health and the environment. Since 1991 it has been Division policy to protect the saline aquifer at the site as though it were a potable Class II groundwater resource. This approach is both protective and conservative.

The Utah Department of Environmental Quality has determined that ground water quality standards for radionuclides must be satisfied for no less than 500 years and for non-radioactive constituents for no less than 200 years. Groundwater Quality Standards for the Class A Combined disposal cell are specified in Table 1A and 1B of the existing GWQDP and are unchanged from those previously authorized for the Class A and CAN disposal embankments.

Results of performance modeling indicate that limitations on seven radionuclides are necessary to ensure that groundwater protection standards will be met. Refer to Section 4.5.1.3 of this SER for more detail.

As described in Section 4.5.1.3 of this SER, concentrations in groundwater as a result of releases from the proposed CAC cell are projected to satisfy applicable regulatory requirements, including the limits stated in the GWQDP conditions (BAT design standards stated in the GWQDP Part 1.D.1).

Based on the information summarized above, the Division concludes that the Licensee's proposed CAC cell is acceptable.

References:

- Whetstone Associates, Inc. 2006b

5.2 MONITORING, SAMPLING, AND REPORTING

Requirement GWDP-664-2 [UAC R317-6-6.4(A)(2)]

2. *the monitoring plan, sampling and reporting requirements are adequate to determine compliance with applicable requirements;*

Basis: The Permittee's proposed groundwater monitoring plan, including commitments for satisfying sampling and reporting requirements, are summarized in Section 4.4.9 of this SER. Twenty eight groundwater monitoring wells around the perimeter of the proposed CAC cell, with well spacing ranging from 150 feet to 424 feet at an average spacing of 350 feet. This well spacing is smaller than and superior to that (460 feet) the Division approved for the LARW cell.

Monitoring wells that will be abandoned during the construction of the CAC cell are discussed in Section 4.4.9, "Environmental Monitoring Program," of this SER and are those presently located in corridor between the Class A and CAN cells. With this exception, this system of groundwater monitoring wells is the same as the Division approved for the Class A and CAN cells. The Groundwater Quality Assurance Program, monitoring frequency, and reporting requirements are all the same as currently approved for the Class A and CAN cells. Thus, the Division concludes that the groundwater monitoring, sampling, and reporting planned for the proposed CAC cell are acceptable.

References:

- EnergySolutions, LLC. 2006a.
- Envirocare of Utah, LLC. 2005a.

5.3 BEST AVAILABLE TECHNOLOGY

Requirement GWDP-664-3: [UAC R317-6-6.4(A)(3)]

3. *the applicant is using best available technology to minimize the discharge of any pollutant; and*

Basis: The Permittee is proposing for the CAC cell the same approach to applying best available technology (BAT) to minimize discharge of any pollutant that has been approved for the Class A and CAN embankments. During operations incidental water accumulations on the clay liner are removed within reasonably short times by vacuuming. Following closure, infiltration is conservatively projected to be sufficiently small that the applicable groundwater quality protection levels will be satisfied for the periods of time required (refer to Section 5.1 of this SER).

The definition of required BAT and the proposed BAT program remain unchanged and include the following:

- Clay liner to minimize infiltration during disposal operations
- Cover system and clay radon barrier following closure to divert rainfall and reduce infiltration into the liner
- Groundwater and contaminant transport modeling to provide confidence that the groundwater quality protection standards will be satisfied for the required 500 years for radionuclides and 200 years for non-hazardous constituents.
- Groundwater monitoring wells to verify acceptable actual performance of the BAT program.

The proposed CAC cell is surrounded with a ground water monitoring system and samples are taken, analyzed, and reported in accordance with the GWQDP.

The only differences between what has been proposed for the CAC cell and approved for the Class A and CAN embankments are:

- The corridor between the previously approved Class A and CAN embankments will be provided with the same 2-foot-thick clay liner. The clay liner for the CAC cell will be constructed in accordance with standard tie-in procedures for locations where new liner meets existing liner (refer to the specification entitled “Keying-In” of the LLRW CQA/QC Manual, Revision 19h, Work Element “Clay Liner Placement” and engineering drawing 05054-C06 for more information).
- Six groundwater monitoring wells previously located in the corridor between the Class A and CAN embankments and implemented as part of the groundwater monitoring system (GW-81 through GW-86) will be plugged and decommissioned for two reasons:
 - ✓ No need will remain following development of the CAC cell to monitor ground water quality at those locations because waste will be disposed on in this area.
 - ✓ Continued presence and monitoring of these wells would complicate disposal operations and potentially compromise the integrity of the cover system that will ultimately be placed on the completed disposal embankment.

Based on the information summarized above, the Division concludes that the Licensee’s proposed CAC cell is acceptable.

References:

- EnergySolutions, LLC. 2006a.
- Envirocare of Utah, LLC. 2005a.

5.4NO IMPAIRMENT

Requirement GWDP-664-4: [UAC R317-6-6.4(A)(4)]

- 4. there is no impairment of present and future beneficial uses of the ground water.*

Basis: Analyses provided by the Licensee project that all applicable groundwater quality protection levels will continue to be satisfied for the required periods of time (refer to Section 5.1 of this SER) should the CAC cell be constructed and operated as proposed. Moreover, groundwater at the South Clive site of the proposed CAC cell is classified as Class IV groundwater, meaning that its total dissolved solid content exceeds 10,000 mg/L. Thus, present and future beneficial uses of the water at the site are extremely limited. Based on these analyses and conditions at the site, no impairment of present and future beneficial uses of the ground water is expected to result for development and operation of the proposed CAC cell.

References:

- EnergySolutions, LLC. 2006a.
- Envirocare of Utah, LLC. 2005a.
- Whetstone Associates. 2006.

6.0 SUMMARY OF LICENSE AND PERMIT CONDITION CHANGES

6.1 LICENSE CONDITIONS

6.1.1 Major Changes

License Condition	Nature of Change	License Page
1, 13	The name Envirocare was changed to EnergySolutions	1 and 5 through 9
29.G	Licensee is require to prepare and submit an annual report of the total activity of each radionuclide contained disposed of in the previous calendar year and of the cumulative activity of each radionuclide in sufficient detail to demonstrate compliance with License Condition 55.	15
Table 40.A	Latitudes and longitudes of approved disposal cells were revised	18
41	Deleted because the LARW cell is already closed and EnergySolutions' as-built report was approved on June 12, 2006.	19
43	Deleted because its substance is addressed by License Condition 38.	19
44	Table of approved engineering drawings revised	19
55	Text was replaced with table and radionuclides and allowable cumulative activity revised	23

6.1.2 Minor Changes

License Condition	Nature of Change	License Page
	Amendment 22B in header changed to TBD	Throughout
	"licensee" changed to "Licensee"	Throughout
	The word "Quality" added to "Groundwater Quality Discharge Permit"	4
	"Class A and Class A North" changed to "Class A Combined"	Throughout
	Reference error corrected from "84.T.(2)" to "88.T.(2)"	4
	The word "condition" changed to "Condition"	Throughout
	"LLRW" added to "LLRW Construction QA/QC Manual"	Throughout
	"May 2005" changed to "March 17, 2006: in reference to Appendix R	13
	"ft ³ " and "yd ³ " changed to "cubic feet" and "cubic yards"	15
	"Bk-247" and "Cl-36" changed to "berkelium-247" and "chlorine-36"	15
	Deleted references to aluminum-26, californium-250, terbium-157, and terbium-158	15
	Added reference to iodine-129, strontium-90, and technetium-99	15
	"Items" changed to "License Conditions"	16
	"currently" added to "currently approved LLRW Quality Assurance/Quality Control Manual"	17, 18, 19, and 21
	Reference to drawing "Series 9821" changed to drawings listed in License Condition 44	17
	"November 17, 2004" changed to "March 28, 2006" in reference to Site Radiological Security Plan	22
	"In direct" changed to "Indirect"	25

	Formatted for consistency	31 through 36
	"Hulquist" changed to "Hultquist"	33
	References for the proposed license revisions added	36 and 37

6.2 PERMIT CONDITIONS

6.2.1 Major Changes

License Condition	Nature of Change	License Page
D.4(a)(1)	Engineering drawing number "9821-01" changed to "05054-C03"	15
D.4(a)(4)	Changed 6-inch to 24-inch for thickness of lower Type B filter zone	15
D.4(b)	Embankment height changed from 54 feet to 85.2 feet	16
D.4(c)	Slope of clay liner change to zero	16
Table 2C	Table of approved engineering drawings revised	17
Table 3	Latitudes and longitudes of approved disposal cells were revised	18
D.7	Strontium-90 added	18
E.7(e)	Deleted Permit Conditions of provisions that are not defined and have remained unused	26
E.7(f)	Deleted Permit Conditions of provisions that are not defined and have remained unused	26
F.1(a)(3) and (3)	Groundwater monitoring wells GW-81 through GW-86 deleted and lists combined	34
Table 7	Latitudes and longitudes of buffer zone boundary locations revised	35

6.2.2 Minor Changes

License Condition	Nature of Change	License Page
	"Class A and Class A North" changed to "Class A Combined"	Throughout
	"Class A" changed to "Class A Combined"	Several
Table 1A and 1B	Table titles revised	2
	Formatted tables for clarity	10, 11, and 23
D.1(1)	Edited for clarity	11
	Added Radioactive Materials License number (UT 23000249)	11, 24, 39, and 54
D.4(a)(2)	"currently" added to "currently approved LLRW Quality Assurance/Quality Control Manual"	19
Table 5	"Decon" changed to "Decontamination"	20
	"respective" added to "respective twelve-year open cell time"	25
	Corrected internal reference from "Part 1.D.11" to "Part 1.D.10"	36
	"radiologic contaminant" to "radioactive contaminant"	43
I.2	Explicitly identified those wells to be addressed in the Background Groundwater Quality Report for the Class A Combined cell and the 2000 Pond compliance wells (those proposed and accepted when the Permit Condition was added)	56

Permit Conditions E.7(e) and (f) deleted because:

- Only non-contact water generated by CWF

Water on the overall CAC cell liner is managed including removed by vacuum truck

PRELIMINARY DRAFT

7.0 REFERENCES

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- AMEC Earth & Environmental, Inc. 2005b. *Geotechnical Study: Repost; Combined Embankment Study; Envirocare*”, December 13, 2005.
- AMEC Earth & Environmental, Inc. 2006, “*Round 2 Interrogatories and Response; Class A Embankment Height Study; Energy Solutions Facility Near Clive, Utah*”, David K. Fadling to EnergySolutions, LLC, AMEC Project No. 4-817-004769, April 28, 2006.
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- _____. 2006b. Letter CD06-0209, *Class A Combined Disposal Embankment – Response to Round 4 Interrogatory*, Round 4, May 22, 2006.
- EnergySolutions, 2006c, "RML UT 2300249 and Groundwater Quality Discharge Permit NO. UGW450005 Class A Combined Embankment - Submittal of Surety Review", company letter from Daniel B. Shrum to Dane Finerfrock, August 23, 2006.
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- _____. 2001b. *Engineering Justification Report – Waste Placement with CLSM*, Revision 0, May 16, 2001.
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- _____. 2000a. *Pre-Licensing Plan Approval Application for a License Amendment Allowing Disposal of Class B & C Low-Level Radioactive Waste*. (Revision of January 5, 2000 plan) March 15, 2000.
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**APPENDIX A: REDLINE VERSION OF RADIOACTIVE
MATERIALS LICENSE UT 2300249, AMENDMENT TBD**

PRELIMINARY DRAFT

**APPENDIX B: REDLINE VERSION OF GROUNDWATER
QUALITY DISCHARGE PERMIT UGW450005, AMENDMENT
TBD**

PRELIMINARY DRAFT